PRESIDENT'S LETTER TO NATIONAL IRRIGATION CONGRESS
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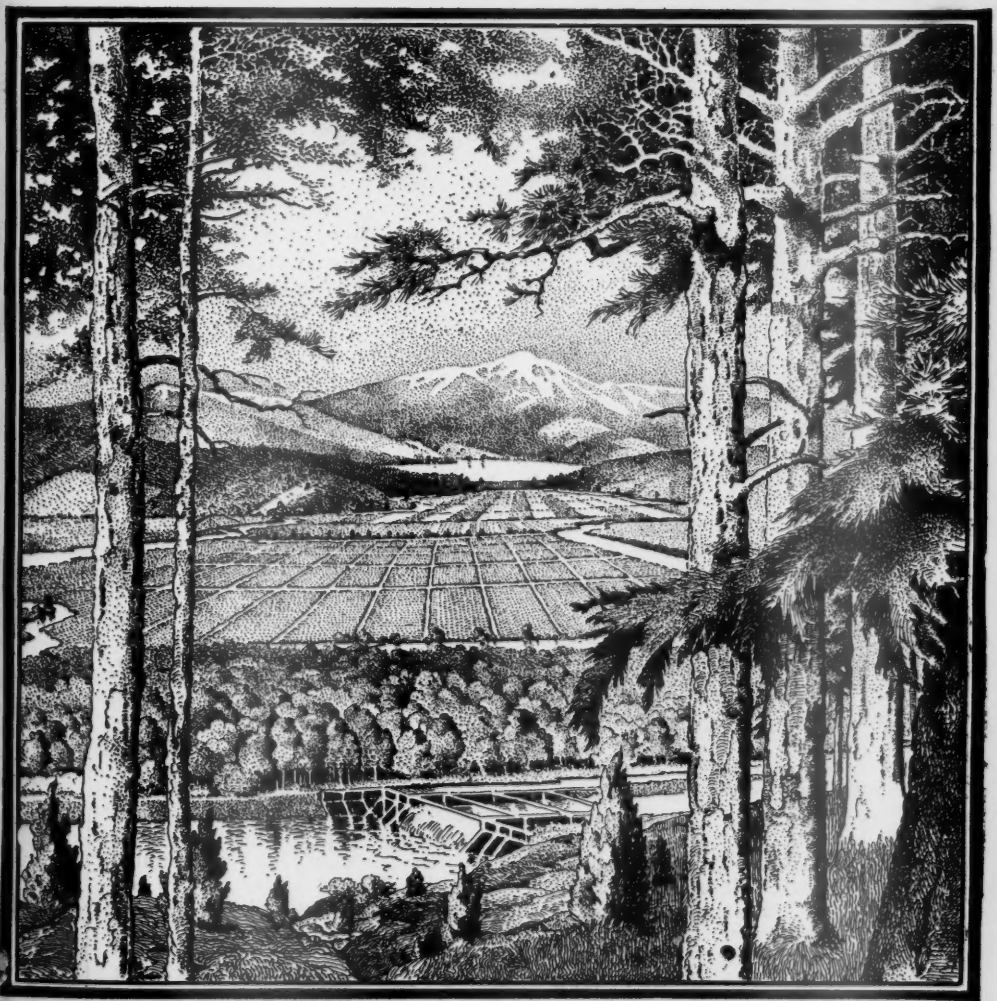
FORESTRY & IRRIGATION



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FORESTRY AND IRRIGATION is the official organ of the Association, and sent regularly to all members.

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Forestry and Irrigation

H. M. SUTER, Editor

CONTENTS FOR SEPTEMBER, 1906

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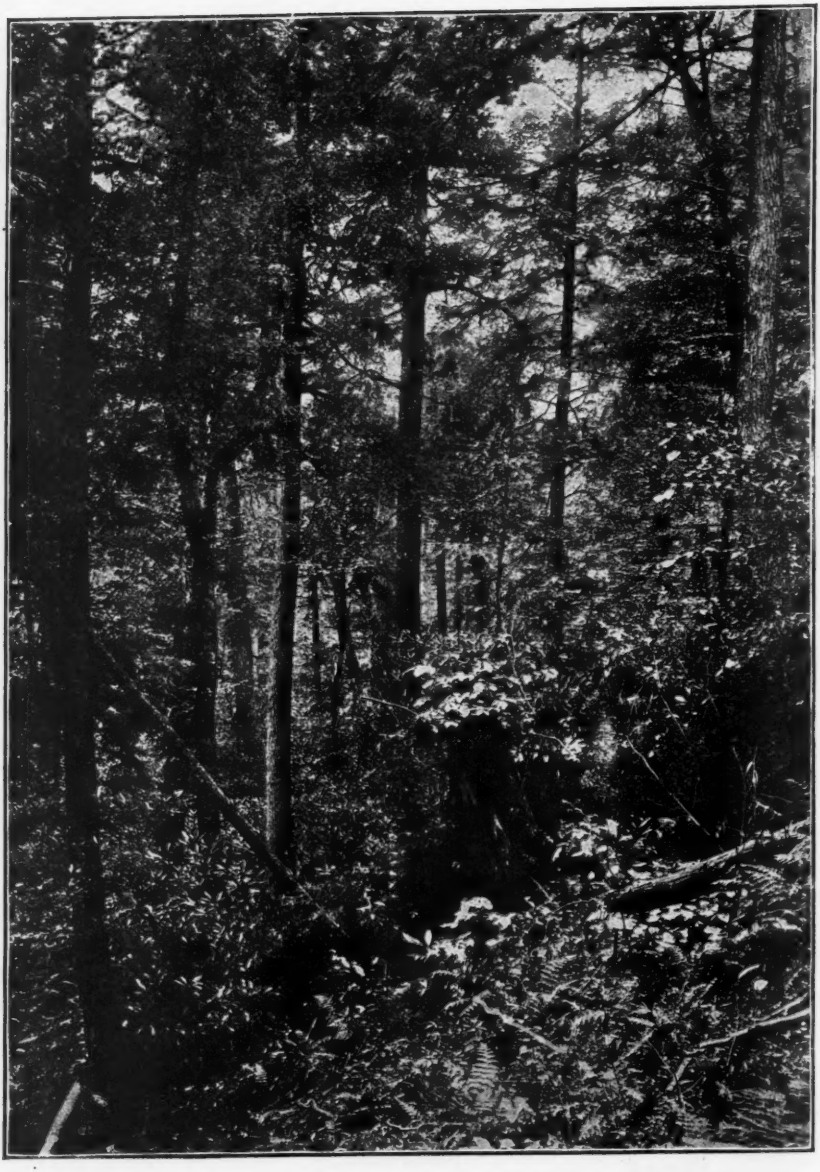


Original Forest, Southern Appalachian Mountains, in the Region of the Proposed National Forest Reserve.

VOL. XII. SEPTEMBER, 1906. NO. 9

NEWS AND NOTES

New Secretary

On September 1 Dr. Thomas E. Will was installed as secretary of the American Forestry Association, succeeding H. M. Suter. Mr. Suter, owing to pressure of personal business found it impossible to devote his time fully to the Association work, and some time ago notified the Directors of his wish to retire as soon as they were able to select a successor.

Dr. Will has spent much time in teaching, lecturing, writing, and administrative work. In 1880, having prepared himself largely by private study, he began teaching in a country school in Woodford county, Illinois, continuing here two years. In the fall of 1882 he entered the Illinois State Normal University, graduating in 1885. From 1885 to 1888 he was occupied in the schools of Illinois, the last two years as principal of the Edwards Grammar School, Springfield, Ill., and as an instructor in teachers' institutes. The years of 1888-'91 he spent in the University of Michigan and Harvard, graduating from the latter in 1890. He was thereupon appointed Henry Lee Fellow and assistant in political economy, in which capacity he continued one year. At the end of this year he resumed teaching, this time as professor of history and political science in Lawrence University, Appleton, Wis. Here he continued two years. The following year, 1893-4, he lectured and wrote in Boston. In 1894 he was elected professor of political economy in the Kansas State Agricultural College, where he continued five years, three as professor, and two as president. 1900 was spent largely in lecturing, writing, and magazine work in Chicago. The two and a half years succeeding were spent in Ruskin College, Trenton, Mo., as professor of social science, and the next two years in Wichita, Kans., as lecturer and writer. In July, 1905, Professor Will entered the Civil Service at Washington in the Bureau of the Census. He was soon transferred, however, to the editorial division of the Forest Service and, on September 1, entered upon the work of secretary of the American Forestry Aassciation. During the past summer he has lectured under the auspices of the Forest Service on forestry in North Carolina, Indiana, Missouri, Oklahoma, and Kansas.

West and Forest Reserves

That Senator Heyburn struck a discordant note in his speech at the Irrigation Congress in which he bitterly assailed the forest policy of the Government, is quite evident from the tone of the press in his own section of the country. The general attitude of the West in the matter is well summed up in the following editorial from the Denver *Republican*:

"There was no justification for the vehement attack which Senator Heyburn made upon the forestry policy of the National Government in the address delivered by him before the Irrigation Congress now in session in Boise, Idaho.

"The policy of to-day differs radically from that of only a few years ago, when the reservations were under care of the Department of the Interior and on proper understanding of forestry existed among the officials of that department. At that time the reservations were managed with but little regard for the immediate needs and interests of the public. The whole thought seemed to be to keep the public out, as though that were the most effectual way to promote forest growth or to prevent the destruction of valuable timber.

"A wiser policy has been inaugurated. The forest reserves are managed now with direct reference to the benefits to flow from them to the ple of this day and generation. The pasturage within their limits is utilized by permitting grazing by both cattle and sheep. Trees of proper size are cut under direction of practical foresters, and thus the forests are made to yield a revenue in timber and lumber which helps cover the cost of maintenance and promotes the proper growth of younger trees. Where agricultural land is shown to exist within the limits of a reservation it is segregated and made subject to location and entry. Thus the settlement of the country is not interfered with by the maintenance of these reserves.

"Let any man study the forestry policy of to-day and he will give it his hearty approval whatever may have been his views concerning the one which was followed a few years ago, but which since then has been abandoned."

Canadian Meeting

As this number of FORESTRY AND IRRIGATION goes to press a forestry convention is being held at Vancouver, British Columbia, upon the call of Lieutenant-Governor Dunsmuir, and under the joint auspices of the British Columbia Lumbermens' Association and the Canadian Forestry Association. Among those in attendance is Mr. Overton W. Price, associate forester, representing the United States Forest Service. He will make an address on the forest work our Government has in hand.

Washington Irrigation Notes

The Hazelwood Company of Spokane has pleted plans to irrigate 4,000 acres of land near Spokane. The land will be cut up into 200 farms, upon which it is purposed to furnish water to farmers at a cost of not more than $2.50 a year.

Electors in Washington will be asked to vote on two constitutional amendments next November. One of them is that the use of the waters of this State for irrigation, mining, manufacturing and for the removal of timber products shall be deemed a public use. The other is that private property way be taken under such terms, conditions and limitations as shall be prescribed by the legislature, but that just compensation must be made.

Advices from Twisp, Wash., are that the Methow Canal Company is rushing work on its big irrigation canal and that the work will be completed early the coming spring. Three thousand acres of land near Twisp will be irrigated. The flume is 138 feet above the level of the land.

The Lewiston-Sweetwater Irrigation Company is planning to furnish water for 3,000 acres of land on Lewiston flat in Idaho, south of Spokane.

The flume will be thirty miles long, the reservoir covering 200 acres.

The Spring Valley Irrigation and Canal Company has been organized to irrigate a tract of 6,400 acres in the Yakima district, south of Spokane. W. G. Chaney, of Spokane, is president.

Twenty thousand acres of land in eastern Oregon, south of Spokane, will be irrigated next year by the Umatilla Water Users' Association. The reservoir will hold 50,000 acre feet of water.

Press Clubs Pledge Aid

At the recent session of the International League of Press Clubs at Denver much interest was shown in the subjects of forestry and irrigation, and the league puts itself on record in the following resolutions:

"Whereas, The subject of irrigation in the arid West is a question of vital and paramount importance in the economy of this country; and,

"Whereas, It is only by the preservation of the forests that the watersheds and streams may be perpetuated and the water conserved for public use; therefore be it

"Resolved, That this sixteenth session of the International League of Press Clubs in Denver assembled, does hereby send greetings to the fourteenth National Irrigation congress at Boise, Idaho, to express our deep appreciation of the importance of the work upon which the congress is engaged.

"We pledge ourselves that by our pens and our influence we will assist the forester of the United States in his laudible policy of preserving the forests of the country for present and future use.

"We also will use our influence toward establishing the Appalachian forest reserve."

Michigan Planting Experiment

A correspondent writing to the *Southern Lumberman* tells of an interesting forest planting scheme in Michigan. Carl E. Schmidt, the millionaire leather man of Detroit, is endeavoring to demonstrate the practicability of restoring the pine lands of Michigan. In Iosco County Mr. Schmidt took up a tract of about 2,000 acres of waste pine land that had been swept by fire and then bid in by the State for delinquent taxes. The soil is light sand, not suitable for farming; in fact, worthless, unless it could be reforested. Two years ago he bought in Wisconsin, in about the same latitude as Iosco, 10,000 white pine seedlings, 5,000 red cedar and 2,000 Carolina poplar and planted them on the 2,000 acres. Ninety-five per cent of the white pine lived and are now growing vigorously, 9 per cent of the cedar took root and are thriving, and 100 per cent of the poplar are doing finely. Mr. Schmidt feels satisfied now that the venture has passed the experimental stage. According to Mr. Schmidt, an average of one factory dependent upon lumber for its stock is leaving the State every week the year around.

Change of Sentiment

A significant change has taken place in the attitude of the people of the West toward the Reclamation Service. When the work began four years ago there was heard on all sides the statement that the Government should not interfere with private development, and fears were expressed that in the great works to be built the Government would in some way interfere with money making by individuals.

In one sense it has been impossible not to interfere with private enterprise, since on nearly all projects some individual or another has made filings on lands or waters and was endeavoring to sell these filings to eastern investors. The construction by the Government of a single large project, developing the country to its utmost, has frequently, in the minds of promotors at least, interfered with their smaller schemes. This condition has, however, now passed. All of the projects to be considered during the next few years have been determined upon by the Secretary, and all questions of

private rights have been practically settled by purchase or agreement. Now comes the demand for more work, and in the anxiety to extend operations the promoters have forgotten their fear that the Government would interfere with private enterprise, and are more fearful that it will not interfere in the sense that it will not buy out the various claims which are being offered for sale.

Maine Forests

The system of forest protection which is being maintained through the State Land Agent's office and the large timberland owners of the State of Maine is constantly being extended and made more valuable every year by the building of new mountain ob-

Debris from Wreck of Sawmill and Log Boom on Linville River, by Floods, in Western North Carolina, in Region of Proposed National Forest Reserve

The experience of the Secretary of the Interior in buying these claims and in extinguishing the various vested rights under different projects has led to extreme caution. There is little probability that he will make any further purchases until the works now in hand are completed and are refunding money to the Treasury. The demand for a large increase to the reclamation fund does not meet with much sympathy from the authorities who have been endeavoring to negotiate these purchases.

servatories. The observatories already located on Squaw Mountain, Atean Mountain and Mount Bigelow have been the means of saving much standing timber from being devoured by fire. These stations mentioned are located where they protect the timberland around the headwaters of the Kennebec River. They have already demonstrated their value and every one of them has a record of fires dis-

covered and checked to their credit. They were started as an experiment, the first having been installed at Squaw Mountain, a few miles from Greenville, by William J. Lanigan, of Waterville, of the Hollingworth & Whitney Company, of Winslow. The system is now being extended to take in the country east and north of Moosehead Lake. To this end stations have been located on Spencer and Whitecap mountains. Spencer Mountain is about ten miles from Spencer Bay on the east shore of Moosehead Lake. The observatory is placed on the top of the mountain, which is about 3,000 feet above the sea level. The man at this station has a view of about 200,000 acres of timberland in the Moosehead and Penobscot watersheds. The station on Whitecap Mountain, which is about ten miles north of Katahdin Iron Works, was installed by J. L. Chapman, of Milo. Whitecap is not so high as some of the other mountains on which stations are located, but it rises abruptly out of a comparatively level sea of forest in the northeast corner of Bowdoin College grant and the station commands a view of some 300,000 acres of timberland on the headwaters of the Penobscot and Kennebec. This station is connected by telephone with Randall's camps at Roach Pond and from there connects with Greenville over the Moosehead Telephone Company line. Next year it is expected that the station on Whitecap will be connected by telephone with Katahdin Iron Works, from which place men can be sent to a fire located by the station quicker than they could be sent from Greenville. These mountain observatories are becoming a great factor in the protection of the Maine forests. The expense of installing the stations is not great, averaging about $750. All the stations are equipped with the most approved range-finders and with a topographical chart of all the country that can be seen. If the man at the station sights the smoke of a forest fire on his territory he can locate the distance by means of his range-finders, and by means of his topographical chart can tell with remarkable accuracy where the fire is. When he telephones news of his discovery to the nearest point from which men can be sent he can tell the man in charge of the fire-fighters the location of the fire so closely that little time is lost in getting to it. There is still a vast expanse of valuable timberland in the State which is not protected by one of these stations, but it seems as if the time is not far distant when every elevation commanding a view of forest country will be topped with a signal station for the discovery and location of forest fires.

Building Great Reservoir

The United States Sugar and Land company of Colorado Springs, operating extensively in the Garden City, Kan., district, has just decided to construct a $300,000 reservoir twenty-three miles west of Garden City, and bids for the work will be asked at once.

The new reservoir will be five miles long and one and one-half miles at its widest point. It will have a capacity in excess of 2,000,000,000 feet of water, and will furnish supplementary irrigation to 100,000 acres of land, the acre feet capacity being 60,000. Work will be started next month, and the reservoir completed by January 1, in time for the winter flood waters.

The fall of the Arkansas River is seven feet a mile in that region, and the ditch fall is two and one-half feet, so that the reservoir waters can easily be conducted eastward through the sugar beet lands of the company, toward the huge refinery at Garden City.

This refinery, said to be the most complete in the world, will be finished October 1, the cost being $1,000,000. The plant will be equipped with the new Steffens process of manufacture, and its capacity will be 800 tons a day. The company has 6,400 acres of sugar beet crops, which will be ready for the plant October 1, and nearly 80,000 tons will be treated. Next year double that amount will be handled.

The United States Sugar and Land company owns 31,000 acres of land on both sides of the Arkansas River, in addition to 150 miles of main ditches and minor laterals. It will have spent upwards of $2,000,000 when the reservoir is completed. All improvements have been made since the organization of the company in August of last year.

Hawaiian Forest Work

Mr. Charles S. Judd of Honolulu, a student of the class of 1907 in the Yale Forest School has received an appointment as special forest agent in the Division of Forestry for a temporary period during the summer.

Mr. Judd was given charge of an investigation of the planted forest on the lands of the Lihue Plantation Company and of Grove Farm at Lihue, Kauai. Careful measurements were to be made of the trees on sample areas in stands of varying age to secure data as to the growth in size and height of the trees growing thereon. The figures obtained will serve as the basis for a report on forest planting in the Territory, which it is expected will be issued during the coming year as a bulletin of the Division of Forestry. The data obtained at Lihue will permit the preparation of yield and volume tables showing what owners of land generally similar in situation, soil and aspect to that at Lihue may expect from forest plantations.

The employment of Mr. Judd to take charge of this investigation is in line with the usage of the United States Forest Service in taking on forest school students to assist in certain of its field work.

Black Walnut

Interesting facts about the black walnut are found in the last issue of *Southwest*. Black walnut is produced in this country at an annual rate of about 33,000,000 feet. The larger portion of it now comes from southwestern Missouri, Arkansas, Oklahoma, and Indian Territory, although there is some scattering growth still picked up in Indiana, Ohio, Tennessee and West Virginia. The most considerable stand of the wood remaining east of the Mississippi River is on the upper waters of the Guyandotte River, in West Virginia, where C. C. Crane & Comnay of Cincinnati own about 20,000 trees. The home demand for black walnut lumber is only for comparatively small quantities. Its use is largely confined to gun stocks, novelties, electrical work, etc. The chief demand for walnut comes from Germany, and Hamburg is the commercial center of the market. The larger portion of the choice logs are faced on four sides and shipped to this market in that form. Specific prices cannot be supplied, because black walnut varies much in quality. The general range is from $125 to $150 for firsts and seconds, and about $75 for rejects, and $30 to $50 for shipping culls.

PRESIDENT'S LETTER TO IRRIGATION CONGRESS

A Notable Document on Government Work in Forestry and Irrigation

To the Officers and Members of the Irrigation Congress,
Boise, Idaho:

Operations under the Reclamation Act, which I signed on June 17, 1902, have been carried on energetically during the four years since that date. The Reclamation Service, consisting of over 400 skilled engineers and experts in various lines, has been organized, and it is now handling the work with rapidity and effectiveness. Construction is already well advanced on twenty-three great enterprises in the arid States and Territories. Over 1,000,000 acres of land have been laid out for irrigation, and of this 200,000 acres are now under ditch; 800 miles of canals and ditches and 30,000 feet of tunnel have been completed; and 16,000,000 cubic yards of earth and 3,000,000 cubic yards of rock have been moved. Detailed topographic surveys have been extended over 10,000 square miles of country within which the reclamation work is located, and 20,000 miles of level lines have been run. Three hundred buildings, including offices and sleeping quarters for workmen, have been erected by the Reclamation Service, and about an equal number by the contractors. Over 10,000 men and about 5,000 horses are at present employed.

The period of general surveys and examinations for projects is past. Effort is now concentrated in getting the water upon a sufficient area of irrigable land in each project to put it on a revenue-producing basis. To bring all the projects to this point will require upwards of $40,000,000, which amount, it is estimated, will be available from the receipts from the disposal of public lands for the years 1901-1908.

We may well congratulate ourselves upon the rapid progress already made, and rejoice that the infancy of the work has been safely passed. But we must not forget that there are dangers and difficulties still ahead, and that only unbroken vigilance, efficiency, integrity, and good sense will suffice to prevent disaster. There is now no question as to where the work shall be done, how it shall be done, or the precise way in which the expenditures shall be made. All that is settled. There remains, however, the critical question of how best to utilize the reclaimed lands by putting them into the hands of actual cultivators and home-makers, who will return the original outlay in annual installments paid back into the reclamation fund; the question of seeing that the lands are used for homes, and not for purposes of speculation or for the building up of large fortunes.

This question is by no means simple. It is easy to make plans and spend money. During the time when the Government is making a great investment like this, the men in charge are praised and the rapid progress is commended. But when the time comes for the Government to demand the refund of the investment under the terms of the law, then the law itself will be put to the test, and the quality of its administration will appear.

The pressing danger just now springs from the desire of nearly every man to get and hold as much land as he can, whether he can handle it profitably or not, and whether or not it is for the interest of the community that he should have it. The prosperity of the present irrigated areas came from the subdivision of the land and the consequent intensive cultivation. With

an adequate supply of water, a farm of five acres in some parts of the arid West, or of forty acres elsewhere, is as large as may be successfully tilled by one family. When, therefore, a man attempts to hold 160 acres of land completely irrigated by Government work, he is preventing others from acquiring a home, and is actually keeping down the population of the State.

Speculation in lands reclaimed by the Government must be checked at whatever cost. The object of the Reclamation Act is not to make money, but to make homes. Therefore, the requirement of the Reclamation Act that the size of the farm unit shall be limited in each region to the area which will comfortably support one family must be enforced in letter and in spirit. This does not mean that the farm unit shall be sufficient for the present family with its future grown children and grandchildren, but rather that during the ten years of payment the area assigned for each family shall be sufficient to support it. When once the farms have been fully tilled by freeholders, little danger of land monopoly will remain.

This great meeting of practical irrigators should give particular attention to this problem and others of the same kind. You should, and I doubt not that you will, give your effectual support to the officers of the Government in making the Reclamation law successful in all respects, and particularly in getting back the original investment, so that the money may be used again and again in the completion of other projects and thus in the general extension of prosperity in the West. Until it has been proved that this great investment of $40,000,000 in irrigation made by the Government will be returning to the Treasury, it is useless to expect that the people of the country will consider direct appropriations for the work. Let us give the Reclamation Service a chance to utilize the present investment a second time before discussing such increase. I look forward with great confidence to the result.

By the side of the Reclamation Service there has grown up another service of not less interest and value to you of the West. This is the Forest Service, which was created when the charge of the forest reserves was transferred from the Interior Department to the Department of Agriculture. The forest policy of the Administration, which the Forest Service is engaged in carrying out, is based, as I have often said, on the vigorous purpose to make every resouce of the forest reserves contribute in the highest degree to the permanent prosperity of the people who depend upon them. If ever the time should come when the western forests are destroyed, there will disappear with them the prosperity of the stockman, the miner, the lumberman, and the railroads, and, most important of all, the small ranchman who cultivates his own land. I know that you are with me in the intention to preserve the timber, the water, and the grass by using them fully, but wisely and conservatively. We propose to do this through the freest and most cordial coöperation between the Government and every man who is in sympathy with this policy, the wisdom of which no man who knows the facts can for a moment doubt.

It is now less than two years since the Forest Service was established. It had a great task before it—to create or reorganize the Service on a hundred forest reserves and to ascertain and meet the very different local conditions and local needs all over the West. This task is not finished, and of course it could not have been finished in so short a time. But the work has been carried forward with energy and intelligence, and enough has been done to show how our forest policy is working out.

The result of first importance to you as irrigators is this: The Forest Service has proved that forest fires can be controlled, by controlling them. Only one-tenth of 1 per cent of the area of the forest reserves was burned over in 1905. This achievement was due both to the Forest Service and to the effective assistance of settlers and others in and near the reserves. Every-

thing the Government has ever spent upon its forest work is a small price to pay for the knowledge that the streams which make your prosperity can be and are being freed from the ever-present threat of forest fires.

The long-standing and formerly bitter differences between the stockmen and the forest officers are nearly all settled. Those which remain are in process of settlement. Hearty cooperation exists almost everywhere between the officers of the Forest Service and the local associations of stockmen, who are appointing advisory committees which are systematically consulted by the Forest Service on all questions in which they are concerned. This most satisfactory condition of mutual help will be as welcome to you as it is to the Administration and to the stockmen. To the stockmen it means more, and more certain, grass; to you, because of the better protection and wiser use of the range, it means steadier stream-flow and more water.

The sales of forest-reserve timber to settlers, miners, lumbermen, and other users are increasing very rapidly, and in that way also the reserves are successfully meeting a growing need.

Lands in the forest reserves that are more valuable for agriculture than for forest purposes are being opened to settlement and entry as fast as their agricultural character can be ascertained. There is therefore no longer excuse for saying that the reserves retard the legitimate settlement and development of the country. On the contrary, they promote and sustain that development, and they will do so in no way more powerfully than through their direct contributions to the schools and roads. Ten per cent of all the money received from the forest reserves goes to the States for the use of the counties in which the reserves lie, to be used for schools and roads. The amount of this contribution is nearly $70,000 for the first year. It will grow steadily larger, and will form a certain and permanent source of income, which would not have been the case with the taxes whose place it takes.

Finally, a body of intelligent, practical, well-trained men, citizens of the West, is being built up—men in whose hands the public interests, including your own, are and will be safe.

All these results are good; but they have not been achieved by the Forest Service alone. On the contrary, they represent also the needs and suggestions of the people of the whole West. They embody constant changes and adjustments to meet these suggestions and needs. The forest policy of the Government in the West has now become what the West desired it to be. It is a National policy—wider than the boundaries of any State, and larger than the interests of any single industry. Of course it can not give any set of men exactly what they would choose. Undoubtedly the irrigator would often like to have less stock on his watersheds, while the stockman wants more. The lumberman would like to cut more timber, the settler and the miner would often like him to cut less. The county authorities want to see more money coming in for schools and roads, while the lumberman and stockman object to the rise in value of timber and grass. But the interests of the people as a whole are, I repeat, safe in the hands of the Forest Service.

By keeping the public forests in the public hands our forest policy substitutes the good of the whole people for the profits of the privileged few. With that result none will quarrel except the men who are losing the chance of personal profit at the public expense.

Our western forest policy is based upon meeting the wishes of the best public sentiment of the whole West. It proposes to create new reserves wherever forest lands still vacant are found in the public domain, and to give the reserves already made the highest possible usefulness to all the people. So far our promises to the people in regard to it have all been made good; and I have faith that this policy will be carried to successful completion, because I believe that the people of the West are behind it.

Sincerely, yours,

THEODORE ROOSEVELT.

FAIRBANKS ON IRRIGATION

The Vice-President of the United States Attends the National Irrigation Congress

"Mr. President and Members of the National Irrigation Congress: It is impossible to exaggerate the importance of the work in which you are engaged. It is fraught with far-reaching interest, not only to the present but to the future. It is a subject to which I have given considerable attention during my public service, for I have been a firm believer in the feasibility of national irrigation, as now contemplated, in the arid and semi-arid regions. It will bring under cultivation large areas of the public domain which would otherwise remain sterile and practically uninhabitable.

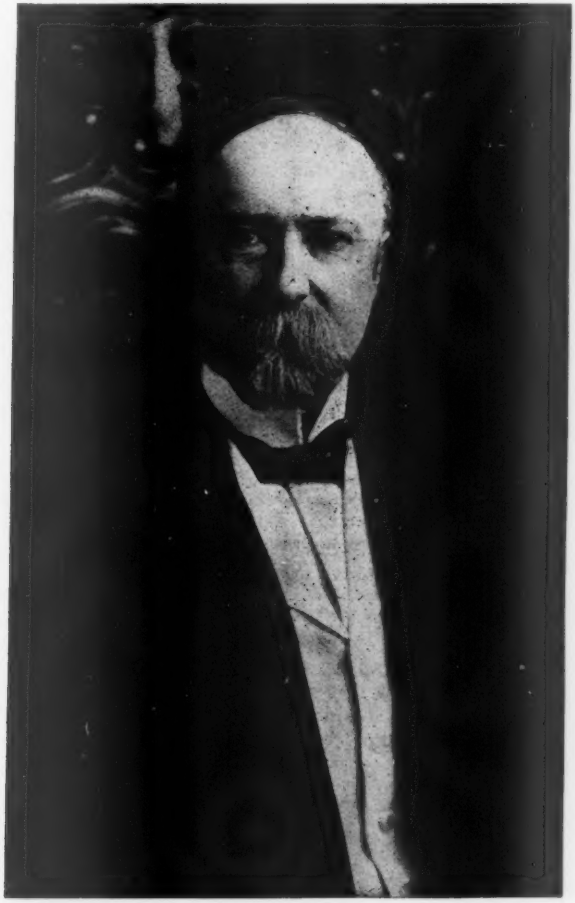
"The rapid increase of population and the pre-emption and settlement of the arable portions of the public lands has rendered it important that we should reclaim the waste places and make them productive through a wise irrigation system which lies beyond the capacity of individual effort. This policy is in the highest degree beneficent. It not only enlarges the field of wholesome, individual opportunity, but it is in a very especial degree, of national significance. It increases the opportunity for the development of the agricultural regions of the republic, for multiplying the number of American farms and American homes, thereby augmenting the great conservative forces which are the surest reliance and safeguard of our political institutions. I firmly believe that the most conservative elements will always be found upon the farm. You will generally find among the millions throughout the great agricultural regions less tendency than elsewhere to inconsiderate and hysterical judgment.

"The general subject which is under consideration is one of those great practical, everyday questions which requires the application of good business sense. The real benefactor, we understand, is the one who makes two blades of grass grow where one grew before. Those who have been engaged in the promotion of irrigation fall most distinctly within this definition and are benefactors of their day and kind. They have the satisfaction of knowing that they have in a measure promoted the interest and welfare of the home-makers. The home-builders of America have been and are as a rule, a hardy people, in love with nature and enamored of their institutions. They have thus far overcome many of the seemingly impossible obstacles of nature in the great arid and semi-arid regions, and have erected their habitation and made prosperous and happy neighborhoods. They are entitled to all success in their beneficent enterprise. Some of our wisest statesmen, of a not very remote past, had but little conception of the possibilities which many of you have opened up to our country and our civilization. We may well believe that, with our larger experience and greater light, we have as inadequate a conception of the vast possibilities of this western section of the country, as many of our predecessors had of the large development which has already been accomplished. The growth of irrigation thus far is largely due to individual and corporate enterprise. It has been carried on by our people for many years in a more or less satisfactory way, but it has not been until recently the subject of national consideration. No one can appreciate the magnitude and the possibilities of the reclamation service in which the national government is engaged and which you are met to encourage, who has not looked upon what irrigation has already accomplished. Go

into the valleys of Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, Wyoming, and so on, and some conception can be gained of the wondrous possibilities of the future by what has already been done. Fruits, vegetables, grains and grasses of almost every variety are produced in profusion upon lands which but a few years ago seemed to the casual observer absolutely valueless and beyond the hope of cultivation. I have observed in many places, to employ the language of Whittier,

* * * orchards sweep
Apple and fruit trees fruited deep
Fair as the garden of the Lord.

"Irrigation lands are made to yield manyfold more than the best unirrigated lands and the certainty of good crops seems to be assured. There is a guaranty against the



VICE-PRESIDENT CHARLES WARREN FAIRBANKS
Whose Address Formed an Interesting Feature of the Irrigation Congress

blighting effects of drouth, and the intelligent husbandman is certain of a bountiful yield as the fruit of his industry. The desert is fast disappearing before the magic touch of American genius, thrift and pluck. What, a few years ago seemed to be impossible, is now being accomplished. It has been demonstrated that there is no investment which has yielded better or surer results than money spent in the construction of feasible irrigation works. It is estimated that some ten millions of acres are now irrigated through individual and corporate effort and that the value of our agricultural products has been thereby increased in the sum of more than an hundred and fifty millions of dollars per annum. It is also estimated that this annual increase is in excess of the total cost of irrigation works through which it is made possible.

"When we consider, in addition to the large money value of the increased annual yield through irrigation, the many incidental benefits resulting from, the magnitude and importance of the subject of national irrigation can be more fully appreciated.

"The government has not entered upon the subject of irrigation hastily and without the utmost consideration. The matter has been thoroughly debated and considered in its physical and economic aspects. When it was first suggested it was regarded by those who had given it only a superficial consideration, as impracticable and as involving a tremendous and unnecessary drain upon the national treasury. The fact was that individual and corporate enterprises had carried the work forward as far as it could reasonably do so. The larger and more difficult propositions awaited the action of the national government.

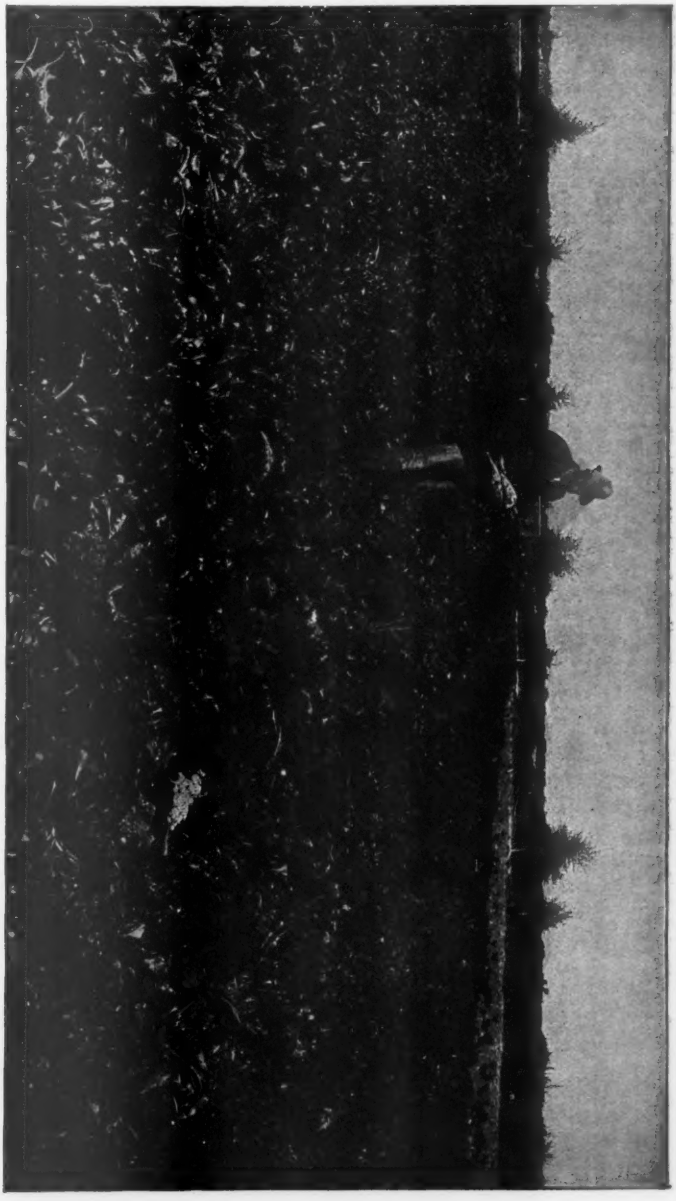
"The existing irrigation law was put upon the statute books in 1902. The law is founded upon an entirely rational and defensible theory. It is entirely just and equitable. None better has been enacted by the congress of the United States in recent years.

"It provides substantially that the money arising from the sale of public lands shall be set apart in a special fund, to be used exclusively for irrigation purposes. The money so derived is to be expended in the establishment and construction of irrigation works and is to become a charge upon the land benefited, and is to be repaid to the government by the land owner in not more than 10 annual payments. It is returned to the reclamation fund and is to be again used in the inauguration and development of new irrigation projects. In short, the fund becomes an endless chain extending its blessings to future years. Not a dollar comes out of the pockets of the taxpayers of the country to promote this great work. It is estimated that the amount to the credit of the reclamation service at the close of the fiscal year, 1908 will be $41,441,572.95.

"Irrigation by the national government has been undertaken so recently that its beneficent results have not yet been felt. The Secretary of the Interior has authorized the construction of many projects in the states of California, Idaho, Colorado, Kansas, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming and in the territories of Arizona, New Mexico and Oklahoma.

"The first allotment for such construction is about $41,441,572.95, and when this expenditure is made, it will bring under irrigation nearly 1,200,000 acres. It will be observed that the cost of the work now authorized is equivalent to the estimated amount of the reclamation fund in 1908. This will not, however, complete the work. It will require some sixty millions of dollars, in addition, to finish the projects now undertaken, and when they are completed, the total amount of land irrigated will be 3,200,000 acres.

"The Secretary of the Interior has under consideration additional projects in Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oklahoma, Oregon, Utah, Washington and Wyoming, which will cost about $109,000,000, and which, when completed, will bring



Field of Sugar Beets in California Raised by Irrigation

under irrigation 3,070,000 acres. It will thus be seen that when the government completes the work it will render arable nearly 6,300,000 acres, at a cost of a little more than $200,000,000.

"To prosecute the work which it has undertaken and which lies before it, the government will have in hand, as heretofore observed, nearly forty-one and a half million dollars in 1908, an amount sufficient to cover the first unit of cost of projects authorized, and for thereafter prosecuting the work it will have the proceeds derived from the future sales of the public domain and the return from the land theretofore irrigated.

"It was the purpose of the author of the reclamation act that irrigation undertaken by the national government should not be entered upon for the benefit of mere speculators. It was their purpose that the public domain and the proceeds arising from its sale, should be appropriated absolutely and entirely for the benefit of homeseekers. The law wisely provides that the limit of area per entry upon the lands irrigable shall be restricted to what would be reasonably required for the support of a family. In order that the entryman may enjoy the benefit of the law, actual and continued residence on the land is required.

"It is obviously the purpose of the great measure, and it is one of its most commendable features, to insure homes to the greatest number of persons, and to bring soil now sterile under a high state of cultivation and productiveness for their benefit and for the benefit of the entire country.

"I believe that irrigation is only in the preliminary stages of its development in the United States. Much has been done, it is true. There is, however, a vast deal more to be accomplished. There are many millions of acres still lying within the arid and semi-arid regions which are non-productive, and which may, in due time, be irrigated. This area is of indefinite extent. It is variously estimated at from fifty to one hundred millions of acres. Of course, the acreage which may be irrigated will depend in a large degree upon the quantity of water which can be stored in the great reservoir systems to be established. The best opinion would seem to indicate that it is reasonably certain that sufficient water may be obtained for irrigating at least 50,000,000 of acres. Twenty millions of acres of this tremendous area is yet a part of the public domain. When the whole is brought under cultivation by means of irrigations, the wealth of the nation will be increased $5,000,000,000.

"This work cannot be accomplished in a day, and it will probably not be done without some mistakes. It will require time, experience, scientific skill and a large expenditure of money to do it. The field is, indeed, a vast one, and in invites our best endeavor.

"While we are concerned particularly with the extension of the irrigation service into the arid and semi-arid regions, I believe in time it will be largely increased in many other portions of the country. The waters in many of our rivers and streams, outside of the arid and semi-arid areas, will be raised and spread over many sections where crops are occasionally destroyed or reduced in yield in consequence of drouth. We can see the limit of our arable areas, but we cannot see the limit of the demand of our increasing population, nor the extent of the demand of millions in foreign countries for American food supplies.

"One of the great practical questions in the future will be how to increase and conserve the productive power of our agricultural regions. Scientific irrigation on broad lines will be a factor of increasing future importance in most of the States and Territories of the Union.

"It is important not only to promote the interests of irrigation, but there is a co-related subject which

Semi-Tropical Growth Through Irrigation in Southern California

is worthy of consideration, and that is—How shall we reinforce and maintain at its highest efficiency the productive power of the soil? Farming is fast becoming a science and the most successful farmer is the one who understands the chemistry of the soil and the products for which it is best suited. We are making marvelous progress in every department of our domestic economy and nowhere is our advancement more marked than in the great field of agriculture."

FORESTRY AND LANDSCAPE ARCHITECTURE

BY

SAMUEL CABOT, JR.

THE interdependence of forestry and irrigation, and forestry and lumbering have been much discussed, but few people seem to realize the important bearing which forestry and landscape architecture have on each other. It is true that many ignorant of the real situation in this country, have advocated the protection of our forests for purely æsthetic and sentimental reasons. The practical forester on the other hand, disgusted perhaps by the outcry of these individuals, has gone somewhat to the other extreme and has tended to make his aim the most efficient production of timber rather than the most "wise use of forests."

Woodland is the most important feature in natural scenery capable of human control and is therefore the most useful material the landscape architect has to work with in informal landscape design. Woodland again is obviously the means, the aim, and the end of forestry. It would be, then, extraordinary if two professions working largely in the same material, should not each cover some part of the province of the other, that is, if forestry (i. e., "The wise use of forests") would not be "wise" in employing landscape architecture, and vice versa.

COMMERCIAL VALUE OF ATTRACTIVE LANDSCAPE.

In the Eastern part of our country real estate is high and forest land divided up largely among small owners. There is also much demand for beautiful sites for spring, summer, and autumn residences. These, however, only anticipate conditions that will be true eventually in other parts of the country. People are constantly buying land for residences, farms and woodlots at many times their value as crop or timber producers. Here is where the farseeing forester should do what he can to enhance the beauty of the land in his charge and raise its value as a house site. Is there a beautiful view from the place? Do not let it be choked with trees, but cut a vista, that the possible purchaser may realize it. Is there an attractive situation for a house backed by an imposing pine grove? Then leave the grove; it is only worth $8 a thousand at the mill, and some millionaire may feel that he cannot live without it. There are many more possibilities of this kind. I know of several instances where well-placed pine groves and, in one case, a single tree, have determined building sites. Many times a clump of stately trees, conspicuously placed, covering, per-

haps, half an acre of land, has attracted a purchaser for a hundred acre farm. I can recall a case where lumbering operations happened to expose a delightful view, a man in a motor car happened to come along, happened to see the view and bought it on the spot. Do not make chance your real estate agent; see that your view is visible and that others know of it.

PRACTICAL FORESTRY ON PUBLIC AND PRIVATE PARKS.

Now we come to land reserved purely for recreation and beauty. There are many such in the East, either private grounds or state and metropoliton reservations. If left to themselves the trees have the usual struggel for existence; in youth an impenetrible tangle; in maturity a good forest, but strewn with dead and decaying timber uninviting and difficult, and only in old age, after a century of struggle, a fine open forest such as we most love, but passing soon to unlovely decay. If this were treated by practical forestry the less attractive period of youth would be shortened by improvement thinnings, maturity would have the open park-line quality of old age, and old age itself be all the heartier. When ripe the old trees would be cut off after a crop of new reproduction was established. Thus the sad period of decay would be done away with and considerable revenue would be assured from the land.

I have not tried to make a plea for either the æsthetic or the practical side of the "wise use of forests," for each has plenty of ardent supporters, but have endeavored to reconcile the two which seem to me to have worked rather at cross purposes, and have attempted to suggest that neither can reach full efficiency without the help of the other.

MEETING OF PHILIPPINE FORESTERS

Annual Conference at Manila of the Insular Forest Service, at which Many Matters of Importance were Discussed

AS HAS BEEN THE CUSTOM in the past, the Philippine Forest Service held its annual meeting, or conference, this year during the first two weeks of July or just after the beginning of the new fiscal year. The objects of this conference are to bring all the foresters together in the Manila office to discuss Philippine forest matters, to propose new laws or to amend old ones, to bring personally to the attention of the Director of Forestry any matters which are best presented verbally, and, in short, to have a general business session, at which everyone will benefit by the discussions of all others present.

At the meeting this year all the foresters, who are also the chiefs of the different forest districts, were present, together with several botanists and representative lumbermen. The Director of Forestry, Major George P. Ahern, presided, and the following foresters made up the meetings: Mr. W. M. Maule, Mr. William Klemme, Mr. H. M. Curran, Mr. H. N. Whitford, Mr. H. D. Everett, Mr. W. I. Hutchinson, Mr. M. L. Merritt, Mr. T. C. Zschokke, Mr. John H. Bridges and Mr. Wm. H. Kobbe.

Each forester read his annual report, which contained a forest description of his district, the lumbering in his jurisdiction, and, in fact, a complete review of all forest matters occurring during the year in his particular territory. These reports were interesting, and the fact that the entire Archipelago is now divided into districts, made the reports all the more valuable. The reports from the new

forest districts were particularly interesting. The Director of Forestry asked many questions concerning each district, and the reports were thoroughly discussed by the meeting. Committees were also appointed by the Director of Forestry to devise a Philippine primer of forestry, to investigate the needs of the service as to field equipment, and to propose and discuss a forest uniform for the Insular Service.

In addition to this committee work the following subjects were discussed: "Improvement of the Forest Service;" "Work of the Foresters;" "Instruction to Rangers;" "Equipment at the Forest Station including herbarium, forest products exhibits, etc.;" "Proposed changes in laws and regulations;" "Free cutting of timber and how to regulate it;" "Improvement in logging methods and use of saws, American axes, etc."

Representatives of the Philippine Timber Cutters' Association attended several sessions of the conference of the present forest policy.

Representatives of the Bureau of Public Lands and Bureau of Internal Revenue explained to the conference points in connection with the homestead laws, land titles and the use of the new Internal Revenue forms for the appraisal of forest products and collection of forest charges.

The botanist of the Bureau of Science spoke with reference to collection and preparation of botanical material for identification.

The entire meeting may be considered a great success and a most pleasurable feature of it proved to be the banquet on the last night of the session. Everyone connected with Philippine forestry was present, and the evening was thoroughly enjoyable.

THE FUTURE FORESTS OF MINNESOTA

A Prominent Lumber Journal, "The Mississippi Valley Lumberman," Offers Valuable Practical Suggestions

AMONG the many State publications that have had more or less to say about the timber resources of this State and the manner in which they have been exploited, the *Pioneer Press* is the first to get down to a sane discussion of the subject, and propose something really practical. Most of them have been content to confine their discussions to abuse of the lumbermen for having pursued the only policy that was possible from a commercial standpoint. In the making of dollars and cents, most business men do not mix a considerable amount of philanthropy. This is not to say that the lumber manufacturers have not been philanthropic. They have been, with the money they have accumulated as a result of strict attention to business, but they have not been in a hurry to sink money in the same line of business in which they have made it. To make the application direct, they have not gone into the business of raising forests when to do so would insure a loss—not because there might not be money in it if conditions were right, but because conditions have never been right, and these conditions have been such as they could not control. Profitable forest raising has not only not been made easy, but it has not been made possible. Laws, and the manner of their administration have prevented the application of any ideas of practical forestry.

The policy suggested by the *Pioneer Press* has been suggested many times by *The Lumberman,* though it may

not have been classified and given in whole at any one time. These measures, in brief, are something as follows: 1. State control of both public and private timber lands, and the compulsory planting of young trees to take the places of mature growth that has been cut. 2. The securing by the State of the remaining federal forests and of Government lands not suitable to agriculture. 3. Forest Service control of the Cass Lake forest reserve. 4. The purchase by the State of rocky and inferior cut-over pine lands which shall be devoted to forestry. 5. Turning over the Itasca state park to the Minnesota School of Agriculture for practical forestry demonstration. 6. The enlargement and extension of the State fire warden service. 7. The exemption from taxation of all lands exclusively devoted to the growth of timber.

Pure Stand of Sapling Norway Pine on the Minnesota Forest Reserve Showing the Forest Possibilities of the State

The first of these—the State control of public and private timber lands and the compulsory planting of young trees—constitutes a policy that has been in force in some foreign countries for years. It should be elaborated to the extent of designating that only trees of a certain size of growth shall be cut, and that for every mature tree cut, at least one young tree shall be started. Then the State government should provide that proper care should be taken of the young trees to prevent their destruction by fire or other causes, so that in time the tree that has been removed shall be replaced by another of commercial value. The second suggestion, that the State should procure from the Government all the remaining forest areas and low grade lands remaining under federal ownership, involves a responsibility that the State has as yet shown no disposition to assume, but which it could well afford to take. The third suggestion, that the Forest Service should control the Cass Lake reserve, might

be extended to give the Forest Service control of all lands in the State which are or shall be devoted to timber culture, at least, until the State is equipped to do as good work. The next suggestion, that the State purchase the cut-over pine lands, will require a greater amount of liberality and foresight than any State legislature has yet shown, but the suggestion is a good one, nevertheless. The State School of Agriculture is well equipped to demonstrate the practicability of scientific forestry, and can undertake that work better than can any private individual or corporation. A concern that must show reasonable profits cannot afford to wait a century for returns. The State can.

Reproduction of Norway Pine on an Old Burnt-Over District Minnesota Forest Reserve.

The last two items in this proposed scheme are worthy of attention at the next session of the State Legislature. One of them has been considered before this, but the legislature has not been disposed toward even reasonable liberality. The office of the State fire warden has been considered in the nature of a pension, rather than as a practical and valuable service to the State. This is true in spite of the excellent results shown. Because these results have been somewhat negative in character their value is not appreciated. It is known that previous to the organization of the State fire warden service there were disastrous forest fires, and that since then the loss of timber by fire has been very small. But the disposition has been to attribute this to chance rather than to give credit where credit is due. Hence the biennial appropriation for the work has been small, and the salary of the chief fire warden has been left at a figure that has permitted little but routine and office work.

The last suggestion, in regard to the taxation of timber lands, is a practical one as regards grown timber as well as the one that will probably be the

last to receive due consideration. In Michigan, in Wisconsin and in Minnesota, timber owners have been fine picking for county tax boards, and in these and other States the removal of the timber has been accelerated by the short-sighted policy of confiscatory assessments. The dead goose has outweighted in value the golden eggs. Even the recent rapid appreciation in the value of standing timber could not have stood the strain of the excessive taxation that has ruled in most localities, and if this is true of timber that has reached its commercial growth, how much encouragement has there been to the raising of timber from the young trees. The annual increasement of growth in a tree that requires seventy-five or one hundred years to become valuable for lumber is much too small to stand a regular tax levy. A tree that is only worth three or four dollars when it is a hundred years old will not assist materially in building up county finances while it is a sapling. But even absolute exemption from taxation will hardly attract private capital to timber raising in this State. The growth of northern pine is too slow. Other classes of timber in other parts of the country show rapid enough growth to warrant practical forestry where a large enough area can be had. In this part of the country lumbermen will leave forest raising to the State or Federal Government. Thus, with the exception of the last, every one of these suggestions are practical, and if Minnesota is to have any standing timber fifty years hence, every one of them will have to be adopted and enforced.

Pure Stand of Sapling White Pine on the "Ten Sections," Minnesota Forest Reserve

SOME POPULAR MISCONCEPTIONS CONCERNING FORESTRY

How They May Be Rectified and Turned to the Advantage of the Forest Movement

BY

LESLIE HARRISON

PERSONS familiar with the true significance of the forest movement in the United States have frequently been amused and sometimes disappointed at certain manifestations of popular misconceptions of the principles of forestry. It is even true that individuals and organizations, with earnest and zealous desires to foster a campaign in which they have great belief, are prone to mix extraneous notions of esthetics or sentiment to the exclusion of fundamental economic principles. The notion, at one time almost prevalent, that a forester lived in the woods and wore a suit of "Lincoln green," may be said to be wholly eradicated. Yet the sentimental ideals are far from dead, and may be summed up in the oft-quoted "Woodman, spare that tree," in spite of the fact that the greater part of the effort of the trained forester is directed toward preparing his trees for the woodman's ax. This is a horrifying thought to many, who feel a revolt within their souls that a tree which has been decades or centuries in the growing may be cut down and utterly "destroyed" within a few hours. They picture in their minds the forest monarch forced to succumb to the blows of mere and puny man, devoid of poetic ideals and with no conception of the marvels of nature or the immutability of time.

There is a lack of the power to distinguish between the set of facts affecting the individual tree and the complex and very different set of facts concerning the forest, or the tree as a part of the forest. The lesson that the United States Forest Service seeks to inculcate is that trees are for use, and all of the efforts of the service are directed, not toward hoarding the trees, but toward making them of the greatest use to the greatest number of people for the greatest possible time. There is an actual analogy between banking and forestry, in so far as the bankers and the forester alike want their wealth used, and in the use to grow in quantity and value.

Let us take two homely examples which will represent the different points of view of the beautiful and the useful, or the ideal and the real:

An old colored man was trudging through the streets of Washington with a bundle of trimmed hardwood saplings, long and straight, over his shoulder. As he went, he cried, not unmusically, "Cloe's props! Heah's yo' cloe's props!" His intent was to appraise the householders that he was vending props, whose forked ends were to be placed beneath the lines when sagged down by the weight of wet garments.

A pleasant appearing woman called to him from her doorway. With expectations of a sale he hastened toward her. When he came near enough to be within range of her voice, which proved to be earnest and vibrant, not to say militant, he heard words like these:

"See here, Uncle! What do you mean by cutting down those beautiful straight young trees? Don't you know that if you had not destroyed them they would have lived to wax strong

and tall, to furnish grateful shade for man and beast. You should have spared them to a nobler destiny than the mere plebian use of supporting dirty linen——"

"Yassum," in open-eyed wonder.

"Now don't interrupt! You have not the iota of a glimmering perception of the glory of the tree, the symbol of aspiration, thrusting its crown ever heavenwards——"

"But dese heah am jes' cloe's props, Ma'am!"

"That's just it! Dead, inert, lifeless and leafless; doomed now to decay in the defiling and careless hands of an ignorant washer-woman; no longer to burgeon with bud and bloom, no longer to put forth their resurrection garments of green, no longer to raise their leafy boughs in suppliance——"

"Yassum!" assented the old darky growing restive. "But cloe's props ain' nevah menat to grow no leaves." He saw the prospects of a sale diminishing and was therefore emboldened to ask, with an air of finality, "Does yo' all want any cloe's props, to-day?"

"No; I do not," answered the lady with some asperity. "I would not thus encourage the wanton destruction of the beautiful young trees. I tell you it is wrong; it is wicked, it is destructive and criminal to make clothes props of God's green and growing things. I could not disgrace myself nor defile my backyard by buying of you and thus encourage the further devastation of——"

"Then yo' don' wan' no cloe's props, Lady? Good day Mis'!" And the old man trudged on, muttering to himself, "Well, ef dat ain' de beatenes'?"

There was right on both sides of the clothes-prop question, yet, all things considered, the old darky was nearer to the real principles of forestry than the lady was. She was left speechless and choking with a righteous indignation at what she considered an awful crime. He, on the other hand, was, as the lady said, devoid of esthetic ideals, and had simply seen the cash value of some saplings on outlying commons which were then being "scalped" for a new suburban subdivision. His industry had converted waste material into a money-making product. The lady exemplified one main type of misconception. Her theory, based on a sentimental concept, was correct, especially since she considered only the relation of the tree to the landscape. The vendor was, however, not far from the fundamental truth that goes with forestry, that trees are for use.

Another case in point where the sentimental and the economic points of view are at variance is found in the annual protest against the cutting of Christmas trees. Letters galore are published in leading periodicals, calling attention to a destructive vandalism in which the innocent little trees are "butchered to make a Christmas holiday." These letters, in many instances, have a rational basis, but more often a colder and more calculating judgment sees many good reasons why Christmas trees should be cut. Here are two attitudes, diametrically opposed. The common or popular point of view sees a great wrong done. The other attitude, held by those who favor an economic use of forest products sees no more wrong in cutting trees for Christmas decorations than it does in cutting them for pulp, for fuel, or for lumber. Nor does it seem any more wrong to those who advocate the latter theory to cut a tree for Christmas than to cut a lily for Easter. Reduced to its simplest economic aspects the case is similar, and if a Christmas tree crop is valuable it should be grown for such value.

The Forest Service does not hesitate to espouse this latter view, and while it may seem only a coldly calculative one, it is not wholly lacking in sentiment, because the foresters believe that there are few uses to which small fir trees could be put which would contribute so much to the happiness and good of mankind as their use for the children on a Christmas day. Moreover, the species cut do not have any

great commercial value, and still less do the actual specimens, which are branchy, open-grown trees that would never be good timber. The lumberman does not deal in the product. The producer of Christmas trees is the farmer who culls them from waste land, and gets a return from an ordinarily worthless growth, which, in many instances is somewhat of a nuisance besides. The annual crop is estimated to be not less than 7,000,000 trees, not counting those culled from suburban commons and used in the cities near which they grow. Yet the whole effect of Christmas tree cutting is infinitesimal upon the life of the forest. It is true that there are occasions where the trees have been cut wastefully or from areas where they have some value as cover. In such cases the remedy lies, not in a prohibition of cutting, but in a wiser method. Also there is some danger that an owner of young evergreens may sell his trees for less as Christmas trees than they would bring as growing stock for a future timber supply. However, it may be taken for granted that the owner of woodland is looking out for the best possible return from that woodland, and the trees will be cut and marketed, or judiciously saved, according to the psospects of the greatest monetary return.

A great measure of the success of the Forest Service, one of the youngest and most flourishing of the Government bureaus, has been the preponderant weight of public opinion behind it. It is also true that the greatest work which the Forest Service has had to do has been to educate the people to the idea that forests are primarily for use. One part of the people has been afraid that they would not be open for use and the other has been fearful that they would be. Both of these notions sprung from the old ideas of the forest preserve where trees stood inviolate. Some wanted that idea continued and others did not.

Perhaps it may be said that the policy of the Forest Service lies between the two. In the administration of the forest reserves, now the chief work and the logical work of the service, stress is laid on the fact that the reserves are for use, under such restrictions as will continue their greatest use to the greatest number of people for all time. The Government does not take the reserves away from the people, but more truly gives the forest areas to them, and in addition takes care of the gift in such a way that it grows in value year by year; becoming the bankers of the people to whom the people entrust their forest wealth, not that the bank may prosper, but that the people's fund of timber may grow and pay the highest possible interest in forest products, whether those products be building materials, railroad ties, mine props, a conserved water supply for city use or irrigation purposes, or a sustained and regular grazing ground for flocks and herds.

The selfish misconception of the forests, which has been but faintly hinted above, is the other great misconception concerning forestry. It naturally has less excuse than the sentimental one, for it is a conscious and deliberate opposition based upon a desire to obtain for a few the privileges which the forests should hold out to the many. It is perhaps unnecessary to go into any details of this attitude, for the whole history of our public lands has been replete with them. It is sufficient to say that those who see in the Government's attitude of a full use of the forest crops some elements to disquiet them, would see far more if the forests were wholly in the hands of some of the individuals who would exploit the timber lands for present purposes only.

Yet, in conclusion it may be said that those who are working for the proper administration of the forests of the United States, public and private, are vastly encouraged by the growing signs of a rational understanding of what forestry means, and an equal relinguishing of some of the older misconceptions. Organizations of public spirited men and women every where are literally "holding up

the hands" of the Forest Service in the work which it has to do. Persons residing near the forest reserves are enthusiastic over the benefits already accruing, even after so few years of Government administration, and petitions are coming in from all quarters for the creation of new reserves. Lumbermen are quickly adopting forest ideas and are cutting for future crops. Lumber manufacturers are utilizing their woods to the greatest possible advantage in many instances and waste is being eliminated in a country which is wasteful by nature.

In short, it is coming to be true that the two chief reasons for calling attention to the popular conceptions concerning forestry, is to note how quickly they are passing, and to help a little toward hastening that passage even more.

THE DUTY OF WATER

BY

ALEX McPHERSON

In charge of the Experimental Farm of the Twin Falls (Idaho) Land and Water Co.

THE soil on the Twin Falls tract is commonly considered to be of volcanic origin, varying from two feet to an unknown depth, consisting of very fine particles.

When we began work on the Twin Falls experimental farm in 1905, we dug prospect holes from seven to 10 feet in depth in order to determine the character of the soil, and the amount of moisture present. The only difference we observed in the soil was that the first foot was somewhat darker in color. With refard to moisture, the first 18 inches contained some moisture, but below it was perfectly dry, consequently we irrigated before planting. It required 24 to 36 hours to saturate to a depth varying from seven to 10 feet.

No effort was made to determine the quantity of water used during the season after that. This year (1906) it was determined to measure the amount of water used on the farm, and the amount running off as waste, as well as the evaporation, with a view to determining the quantity of water necessary to keep the soil in proper condition.

The miners' inch was used in measuring half a cubic foot per second of the farm, and a device was employed in connection to obviate any fluctuation in the head. A weir with an automatic register attached was used as a check on the miners' inch measurement in order that we might be sure that just the amount of water desired was supplied.

At the lower end of the farm, a weir register was installed for measuring the waste. Elias Nelson of the Bureau of Irrigation and drainage investigation, added an evaporating tank.

We began irrigating May 2, with the amount of water allowed under the contract between the settlers and the Twin Falls Land & Water company—that is 1-80 of a cubic foot per second per acre, continuous flow.

The amount of water applied during each month up to the first of September, 1906, is given below, as well as the waste and evaporation:

Total amount applied, 36.10 inches; total percentage, 100 plus.

Total amount precipitation, 0; total percentage, 12.4.

Total amount wasted, 4.49; total percentage, 7.4.

Total amount evaporated, 28.06 total percentage, 77.7.

Total per cent wasted, 7.4.

Total per cent evaporated, 77.7.

Total difference (or water retained by the soil), 5.694 inches; 15.8 per cent.

The waste during the month of July was greater than any other month. This occurred while we were irrigating the lower tier of plats, and no opportunity was afforded whereby we could again use the waste. The farm consists of 40 acres, and being an experimental farm, there are a great many different crops grown, requiring water at different times and in varying quantities.

The evaporation almost equaled the amount of water applied during this month, less the waste and evaporation as shown by the evaporating tank.

Assuming that the evaporation from the water-free surface in the tank was equal to the amount evaporated from the ground, plus the amount used by the crops, we can have some idea of the amount of water actually required.

No doubt if less water had been applied, the results, as far as the crop production is concerned, would have been the same or greater, as was indicated by some tests made by Mr. Nelson, showing that the third foot of soil lost much less moisture in a given time than the first or second foot. The roots of certain crops penetrate to a depth where they would be able to draw upon the moisture to a greater depth than the shallow rooted ones.

If all the crops grown had been of the kind that could have been cultivated, thus conserving the moisture, I am sure much less water would have been required.

Taking the four months, or 122 days as the irrigating season, we used water 24 days, 9 hours in May, 26 days in June, 22 days 9 hours in July, and 23 days and 2 hours in August, leaving 26½ days during the irrigating season when water was not used.

These results show that 1-80 of a cubic foot per second continuous flow is more than necessary at Twin Falls, where the soil is very deep.

I believe if the land were given a thorough irrigation late in the fall, thus storing the moisture in the soil for use the following year, it would be a great saving of time and labor, and materially lessen the amount of water used during the irrigating season, besides being more economical, and as the surrounding areas become moistened through irrigation, with proper cultural methods, less and less water will be necessary each year until half the amount used this year will be sufficient.

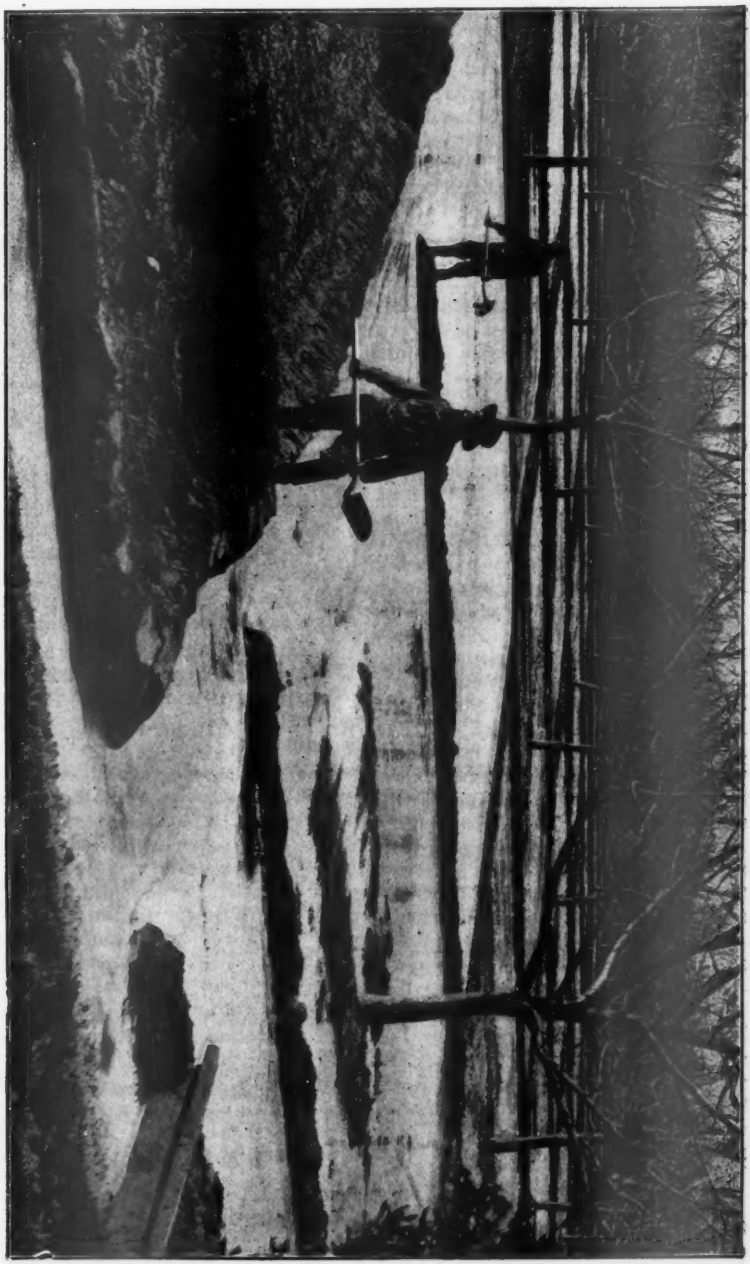
Just what the duty of water will be on the Twin Falls tract a few years hence, I am unable to say, but I believe that it will be far greater than now, as the people are becoming educated in the use of water, and find that less water and more attention to the soil give greater and more beneficial results. This fact was demonstrated this year on a portion of the experiment farm, where last fall it was irrigated late, and only one irrigation was required this season to produce 70 bushels of wheat to the acre and 96 bushels of oats.

The character of the soil and the lay of the land should indicate the best method of applying water.

Two methods have been tried on the Twin Falls tract—flooding, and by furrows or corrugations. After a thorough trial, the corrugation method has been given the preference, and fully 90 per cent of the farmers have adopted this method.

I believe that it is the better of the two, especially when annual crops are grown, such as grain, etc. While it is true that some others claim that the duty of water is greater by flooding than by corrugation, that has not been by experience in the portion of the arid district where I am located.

As it is understood that water only goes into the soil under pressure, and that plants practically stop growing when the air is excluded, which is done by flooding, this is objectionable.



Winter Irrigation in California

Then again we understand that plants only use the ascending or capilary moisture, consequently the ideal way of applying water is to do so without shutting off the air, or causing the soil to bake, which is the result more or less if flooding is followed in this section.

This is especially true of nearly all crops excepting grasses. Then again, water is more easily applied by the corrugation method than by flooding, and if the corrugation system is properly constructed, water can be applied, so that it will run night and day with less labor or care, and with comparatively none, if any, damage to the land.

I consider the corrugation method the best for applying water, at least on this tract, or any other tract having the same conditions.

I will try to describe the system I have advocated to the farmers on this tract, the great portion of whom have followed the advice given:

First, the land is graded, so that the water will not be turned from its course in the corrugations by the high places. It is not necessary to have a perfect outline, but there should always, necessarily, be fall enough so it will continue on its course.

We then run the corrugations or small furrows two feet apart in the direction in which the water is intended to flow. Cross ditches are then run at right angles with the corrugations from 300 to 500 feet apart, according to the grade or fall of the land. Check boxes are put in each cross ditch, the distance apart being governed by the fall of the land. The sharper the pitch, the more check will be necessary. The nearer level the supply ditch is, the less boxes will be required, and within a reasonable limit, will carry sufficient water to irrigate the land intended.

Check boxes are so constructed that the water will flow over and not under the splash boards. The water is raised by these splash boards as high as needed, so that the water between the check boxes, when raised to full height, will stand on a level, the- excess water being allowed to go over the splash boards, and be caught up by another check box.

To divert the water from the cross ditches into the corrugations lath boxes are used—each of these boxes will supply from one to three corrugations, depending upon the pressure in the cross ditch and the length of the corrugations.

Four laths will make two or three boxes, according to the length required. The laths are simply nailed together in the form of a square, and cut into two or three sections, as the case may require. The boxes are then placed in the bank of the ditch, the top of the lath box being a little below the level line of water, so all will receive the same pressure, and flow steadily night and day. If they are kept clear, they will remain in position for service indefinitely.

Three thousand laths will make enought boxes to furnish one for each corrugation on a 40-acre field, the field being cut into three sections.

Boxes in the head ditch for the section below control the drain water from the section above, so that all drain water is picked up and redistributed further on down the field.

When check boxes and lath boxes are set in place, the land being properly graded, irrigation is no longer a task. Under this system, with a regular head of water, irrigation becomes automatic.

The condition of the soil on the Twin Falls tract is such that it takes about 12 hours to properly irrigate a field in each secton, as above indicated. On many so arranged farms, irrigation is looked after twice a day—in the morning before work commences, and in the evening after work is over.

It can readily be seen that irrigation under the above system is not

a task, but in reality a pleasure. When flooding is practiced, especially on new land, the water is hard to control, the cost of labor is increased, and damage to the land from water is probable.

Moreover, it is dangerous to attempt flooding at night. By the corrugation method, water can be applied night as well as day with perfect safety.

Besides, under the corrugation method, there are no pools formed in low spots—the land receives water uniformly, in the way and manner desired.

THE FOURTEENTH NATIONAL IRRIGATION CONGRESS

Held at Boise, Idaho, September 3–6
Large Attendance from Many States

BY

LYDIA ADAMS-WILLIAMS

THE Fourteenth National Irrigation Congress, which was in session at Boise, Idaho, during the week beginning September 3, was largely attended, and proved interesting and instructive. There were in attendance nearly 1,500 delegates, representing forty States and Territories, besides several governors of states, Senators and Representatives in Congress, many members of the United States Reclamation and Forest Services, and many others prominent in the progress and development of the country.

Mr. Gifford Pinchot, Chief of the U. S. Forest Service, who was the personal representative of President Roosevelt at the Irrigation Congress, bore a message from the President, which, when read, showed such a wealth of accomplishment and amount of work done along the lines of national irrigation, as to astonish even the most ardent supporters of the Government reclamation policy.

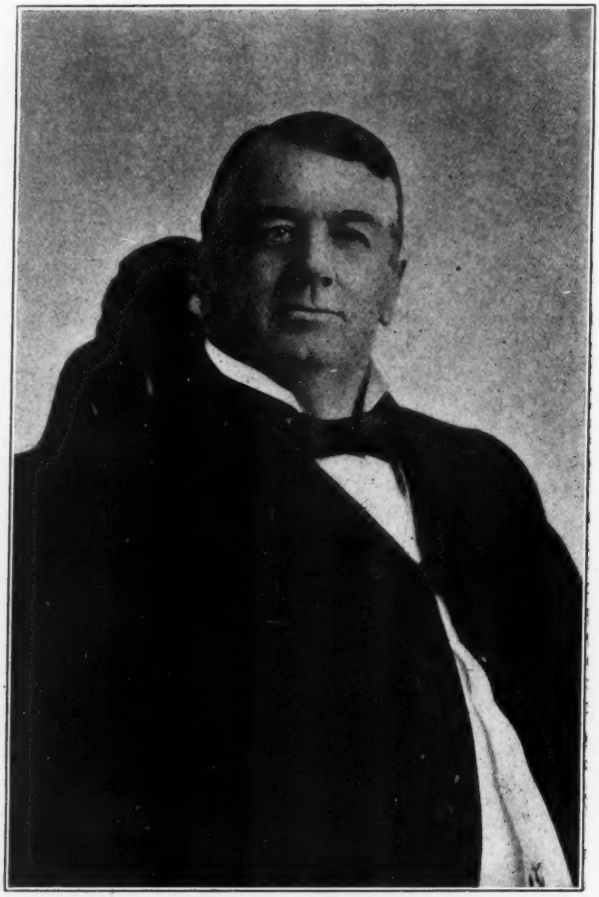
One of the most eloquent addresses delivered before the congress was that of the Vice-President of the United States, Charles Warren Fairbanks.

In a forceful and masterly speech which was listened to with the closest attention and which was punctuated by frequent applause, the Vice-President covered every phase of the great irrigation problems in which the Government is now engaged, and affirmed his life-long belief in the feasibility of national irrigation, as now contemplated, in the arid and semi-arid regions.

One evening of the congress was given up to a discussion of the forestry question, which was enlivened by a spirited debate engaged in by Mr. Gifford Pinchot, Senator Heyburn, Senator Dubois, Congressman Reeder and others.

Mr. Pinchot gave a lucid explanation of the work of the Forest Service, and of the purposes and aims of forest reserves. His views were upheld by Senator Dubois and Congressman Reeder, and others. Senator Heyburn made an attack upon the manner of creating and regulating forest reserves. He was interrupted many times, and questions, denials and contradictions were hurled at him. Although he parried all thrusts and counter thrusts and made an eloquent and impassioned speech, it was evident that the sympathies of the large audience were with the forester and the forest policy of the Government.

Others of prominence who took part in the deliberations of the congress were F. H. Newell, chief engineer of the Reclamation Service, who delivered an interesting and instructive address on "Progress of National Reclamation;" C. D. Walcott, director of the United States Geological Survey, who spoke on "Relation of Government recamation work to private enterprise;" Elwood Mead, director of the work of irrigation and drainage investigation, who delivered an able address on "Evolution of Irrigation Institutions;" Morris Bien and L. H. Taylor, of the Reclamation Service; Mr. Wm. L. Hall, Mr. E. A. Sterling, Mr. A. F. Potter, Mr. Hill, Mr. Sherman, Mr. Siecke, and others of the Forest Service; Senator Carter, Senator Heyburn, Senator Dubois, Senator Moses E. Clapp, Hon. Frank W.



UNITED STATES SENATOR WELDON B. HEYBURN
Of Idaho, whose Antagonism to the Government Forest Policy in the West is Most Pronounced.

Mondell, Hon W. W. Reeder, Governor Chamberlain, of Oregon; Governor Mead, of Washington; Governor Gooding, of Idaho; Hon. St. George Tucker, president of the Jamestown Exposition; Judge L. W. Shurtliff, Thomas H. Means, Hon. John F. Lacey, Wayne Darlington, Hon. C. C. Moore, D. E. Burley, Hon. Cyrus Happy, State Senator John A. Laycock, of Oregon; Monte B. Gwinn and John McMillan, and Hon Edgar Wilson.

Part of the last day's session was devoted to the election of officers, with the following result: President, Hon. George E. Chamberlain, governor of Oregon; first vice-president, Hon. John H. Smith, of Utah; second vice-president, Hon. H. B. Maxson, of Nevada; third vice-president, Hon. George W. Barstow, of Texas; secretary, D. H. Anderson, of Chicago.

Sacramento, Cal., was selected as the place for holding the fifteenth session of the National Irrigation Congress.

The report of the committee on resolutions as presented to and adopted by the congress expresses the hope that the governmental irrigation works under construction and in contemplation will be pushed to an early completion; heartily approves the efficient and thorough work of the federal Reclamation Service and expresses the fullest confidence in the honesty and ability of that service; endorses and commends the earnest and efficient work of the national weather bureau; commends the work of the Federal Agricultural Department in its irrigation and drainage investigations; recommends that the Irrigation Congress authorize its president to appoint a committee of five members to carry on a campaign of publicity in relation to irrigation, this committee to be authorized to employ a secretary at a salary of $25 a month; pledges earnest support of the Federal Forest Service in its efforts to maintain and improve the country's water sheds; favors the passage, with certain amendments, of Senate bill No. 4264, relating to the relinquishment of reservoir sites, with the privilege of selecting lieu lands; expresses the opinion that Government enterprise for reclamation should not unnecessarily interfere with prior private enterprises; endorses the Federal Department of Agriculture's experiments in dry farming in semi-arid regions; recommends the enactment of a federal law prescribing penalties for unlawful interference with federal headgates and other irrigation works.

The committee recommended the following resolution in relation to the tariff on sugar from the Philippines, which was adopted:

"Inasmuch as the sugar beet industry in irrigated America returns to our farmers an annual revenue of over $20,000,000, and as the production at home of the sugar we now import from the tropics would afford our farmers an additional annual market for nearly $100,000,000 of beets, and as it has been urged that the United States Congress further stimulate the sugar industry of the Phlippine islands to produce all or a portion of the sugar we of arid America had hoped to produce.

"Therefore, we protest against any further legislative concessions in favor of Philippine sugar and urge that legislative agitation and attacks on the sugar production of this country cease, that this great industry of airid America may be fully developed."

In conclusion the resolutions express thanks to the people of Boise for the manner in which the delegates were entertained and compliment the retiring officers of the congress.

Another resolution expressed appreciation of the interest shown by President Roosevelt in irrigation and reclamation work and of Vice-President Fairbanks' courtesy in coming to address the congress.

A resolution introduced at the instance of persons interested in the Arkansas River litigation and adopted says:

"We recommend that the Congress of the United States consider the extension of the jurisdiction of the United States courts to provide for the judicial determination of water rights on interstate streams."

Government Irrigation Work During the Month

Pathfinder Dam

The Supervising Engineer in charge of the North Platte irrigation project, Wyoming-Nebraska, reports that on August 15th the foundation was ready for stone laying and the first stone was set in the great Pathfinder dam. The work of stone laying has continued without interruption and it was expected that the entire foundation would be ready for masonry by the present time.

The construction of this dam has for its object the storage of flood waters of the North Plattee River, to be used for the irrigation of large tracts of land in Nebraska and Wyoming. It will contain 53,000 cubic yards of masonry, erected at a cost of $1,000,000. The capacity of the reservoir will be 43,560,000,000 cubic feet, or more than ten times that of the Croton reservoir in New York. The annual discharge of the river is sufficient to cover 1,000,000 acres of land one foot in depth, and the dam is capable of holding back the flood and surplus waters of the entire year.

According to the last census, within the drainage basin of the Platte River is found the largest area irrigated by one stream in the United States, and the value of the improved agricultural land is probably as high as any other section, with the possible exception of the fruit belts of California and central Colorado. All the natural late summer flow of the stream has long since been exhausted by private ditches diverting water from it. A million acre feet of water, not a drop of which is now in use, will be stored annuallv by the Pathfinder dam, and directedthrough canals and ditches upon 300,000 acres of land. The canal system will be the longest in the United States, the main or Interstate canal having a length of 140 miles. The first 45 miles of this canal was completed early this spring and water turned into it on May 5th. Some 1,200 acres of land are in crop and have been watered during the season.

The Geddis and Seerie Stone Company of Denver, Colo., are constructing the dam. Excellent progress is being made on all parts of the system. The great work not only means the reclamation of a vast tract of arid land, but the prevention forever of the destructive floods which annually have visited the valley.

Shasta Valley

During the fall, summer and winter of 1904, petitions signed by practically all the resident land owners of Shasta Valley, Cal., were presented to the Engineer of the Reclamation Service, asking that survey be made to determine the feasibility of irrigating that valley from the Klamath River. A field party was accordingly assigned to the work and during August and September of 1905 a reconnaissance of the valley was made.

Shasta Valley is located in northern California and contains the largest body of farming land in Siskiyou County. It is from two to six miles in width, about twenty-four miles long, and lies at an elevation of from

2,400 to 3,000 feet. It is traveled throughout its entire length by the Southern Pacific Railway, which affords excellent transportation facilities to the markets of San Francisco and Portland. The climate is mild, the temperature ranging from 110 degrees above to 5 degrees below zero. The springs are rather late and frosty. For the last ten years there has been an average rainfall of 17.6 inches, but as not more than half an inch of this comes during July, August, and September, irrigation is necessary for successful farming.

There are approximately 100,000 acres of agricultural land in Shasta Valley, held for the most part in private ownership. Of this amount about 58,100 acres are irrigable from Klamath River from gravity flow, and it is believed possible to irrigate 10,000 acres more by pumping. A lift of 200 feet would be required, and power could be developed for this purpose, although the cost would probably be excessive. From Little River and various springs there are now perhaps 10,000 acres under an imperfect system of irrigation.

About sixteen miles below Keno, Ore., the waters of Klamath River can be diverted by an eight-foot weir and carried along the east bank of the river into Shasta Valley, and there applied for irrigation upon 58,100 acres of land. Because of the precipitous canyons the water must be carried for a distance of twenty miles either by a series of long tunnels, or by short tunnels and cement lined canals. The former could be maintained with much less expense when once constructed, but the first cost would be so great that a line contemplating three short tunnels, two siphons, and cement lined canals was surveyed.

The total estimated cost of the system as outlined is approximately $3,784,238, or at the rate of $65.13 per acre for the construction of works to irrigate 58,100 acres. There are about 5,000 people in this valley, depending upon lumbering, mining, stock-raising and farming for a livelihood. Wheat, oats, barley, vegetables, wild hay, alfalfa and fruits are grown.

With the enthusiasm and enterprise so characteristic of the farmers of California, the land owners have expressed a desire to organize a water users' association and to coöperate in every way possible with the Government if the project is undertaken. In view of the large acreage cost and the present state of the reclamation fund, however, the engineers of the Reclamation Service do not deem it wise to recommend consideration of the project until the Klamath project is beginning to return revenue at least. There are many opportunities for reclamation work in the Sacramento Valley, and in case a small economical project develops it would be manifestly unfair to the State to begin work which for lack of funds might not be completed for many years when other work could be taken up and completed quickly.

Lower Yellowstone Dam

The Secretary of the Interior has awarded contract for the construction of the Lower Yellowstone dam, Lower Yellowstone irrigation project, North Dakota-Montana, to the Pacific Coast Construction Company, of Portland, Ore., for the sum of: $142,825.

This dam is to be a rock-filled, timber cribbed structure across the Yellowstone River at the headworks of the canal, about eighteen miles northeast of Glendive, Mont., and according to the terms of the contract will be completed February 1, 1909.

The river at this point has been considered navigable, although boats have not been up the Yellowstone River since the time of the Custer massacre. At that time the daring steamboat men succeeded in forcing light draft boats up the Yellowstone and up the Big Horn to a point where they could receive the wounded soldiers and bring relief to the troops.

The building of this dam marks the close of navigation on the Yellowstone River and the practical dedication of its waters to irrigation and the crea-

tion of homes for thousands of settlers in place of allowing the stream to flow idly to join the Missouri without benefit to the community.

On Cash Basis

The Reclamation Service has definitely put all of its engineers and experts on a cash basis. During the period of initiation of the work it was necessary to pay the men in the field not only their regular wages, but also to furnish them subsistence. With the creation of permanent camps or stations the necessity of furnishing rations no longer existed, and it seemed wise to require that all men, whether laborers or engineers, obtaining subsistence at these camps should pay a flat rate of 75 cents per day for meals furnished. This charge is accordingly deducted from the salaries or wages paid, and these are adjusted accordingly, so that salaries are now comparable on a money basis, and are not confused with the questions of subsistence.

Tunnel Half Done

More than one-half of the great Gunnison tunnel in Colorado was completed by the first of September, according to a report from the engineer in charge of the work. The total length from the east portal in Gunnison canyon to heading No. 1 on August 31st was 4,416 feet. The total length from the west portal, in Uncompahgre Valley, was 10,896 feet, making a total of 15,312 feet.

The Reclamation Service, which is prosecuting the work by force account, has broken the world's record in tunnel construction on this work. During July and Augiust, however, the rate of progress was reduced on account of an extremely hard vein of rock in heading No. 1 and the treacherous ground in heading No. 2, which required handling with the utmost caution in order to prevent loss of life and destruction of property. The difficulties in connection with ventilation and transportation also increase with the length of tunnel from portals. Six hundred and ninety-eight feet were excavated during August. Machinery is in place and the work of placing concrete masonry will commence this month. Work on the South side canal is progressing satisfactorily.

Pumping in Kansas

In September, 1905, the Secretary of the Interior approved the plans for the construction of a pumping plant in the Arkansas Valley, near Garden City, Kans., to supply water to the Farmers' Ditch. Contracts have been let and the work of construction of this project is now under way under the supervision of the U. S. Reclamation Service.

Mr. Charles S. Slichter, of Madison, Wis., who made an extensive investigation of the movement of the underground waters of the Arkansas Valley is in Washington for a few days and is most enthusiastic over the future of that portion of Kansas. He said: "The stimulus given to this part of the Arkansas Valley by the proposed pumping plant has greatly developed the installation of pumping plants by private parties. The census recently taken shows that 162 privately built pumping plants have been put in service in the Arkansas Valley within the last twelve months.

"A large number of these pumping plants are operated by gasoline engines. A few that have been installed at Rocky Ford, Colo., use hard coal in gas generators which supply gas engines. These gas plants at Rocky Ford show very remarkably results in the production of power at low cost. A test of a thirty-five horsepower pumping engine at Rocky Ford for ten days during the month of May, 1906, showed that the cost of coal per hour averaged but 7 cents. At this place the fuel used costs $6 per ton at the ranch.

"It is believed that the development of the bottom lands in Arkansas Valley by private pumping plants has just begun, and a very large number of new ones will be put in during the present year."

Apportioning the Fund

A few weeks ago announcement was made of the receipts from the sale of public lands in the arid States and Territories. When it was discovered that the increment to the reclamation fund was considerably in excess of the estimates there was much rejoicing throughout the entire West.

Letters have been pouring in to the office of the Reclamation Service from settlers, legislatures, and other interested in the movement, requesting the allotment of funds and initiation of irrigation works in various localities.

It is not within the province of the director to apportion reclamation funds, but merely to call the attention of the Secretary of the Interior to feasible projects. The engineers of the Reclamation Service are not losing sight of opportunities of extending the work, and many projects have been investigated and will be taken under consideration as soon as funds for their construction become available. The Secretary of the Interior has already apportioned the fund for some years in advance, and although the receipts from the sales of land may be larger than anticipated by the General Land Office, yet this increase is more than offset by the recent advance in the price of labor and materials and the diminished efficiency of ordinary labor. The rigid enforcement of the eight-hour law has also contributed to the general increase in costs to the contractor. A number of prominent contractors are failing or on the verge of bankruptcy and prices of construction are running up rapidly. When the contractors become unable to fulfill their contracts the Reclamation Service is obliged to carry on the work by paying higher prices than the contractors can afford to give. But even under such circumstances the labor supply is unequal to the demand.

Most of the reclamation works are situated in regions remote from large towns, and after eight hours of labor there is little opportunity for relaxation or enjoyment. During the long hot days the man who is exercising moderately in the sun fares more comfortably than the one who has nothing to distract his attention from his discomfort in the hot bunk house. When life grows too monotonous the men throw up their jobs, secure in the knowledge that in these prosperous times they can secure employment elsewhere without much trouble.

Another factor to be considered in the allotment of the reclamation fund is the fact that there has already passed the Senate and been favorably reported to the House, a bill taking $1,000,000 out of the reclamation fund for drainage in North Dakota, and there are a number of other bills pending which, it is asserted, have fair chance of passage if the first bill gets through Congress. Under these circumstances the Department may not consider it advisable to enter upon any further projects until the probable diminution of the reclamation fund is made known.

Several of the twenty-two projects now under way, as well as numerous others which will be taken up immediately funds become available, will receive a serious set back if the reclamation fund is diverted for other purposes. Citizens of the West are even now impatient that the Department is forced to delay in talking up the projects that would make productive millions of acres of arid land and afford homes for a multitude of settlers. All these projects require large sums of money to complete, and it is only by the wisest use of the fund designed for the purpose by Congress that the work can be carried to successful completion. That other improvements in other States are needed there is no doubt, but this nation is able to make them without endangering the benificent work of homebuilding in the West.

It has been said of a Roman Emperor, "He found Rome brick; he left it marble." So of this generation of Americans let it be said "They found the West a desert; they left it a Garden of Eden."

Oklahoma Conditions

Irrigation in Oklahoma under the terms of the Reclamation Act has been delayed because all of the examinations and surveys that have been made have failed so far to develop a practical project from an economic stand point. The engineers in the field have been seriously hampered by the rainy weather and flooded streams.

As a preliminary and essential element of the investigation, it was decided to erect a pumping plant to utilize the river water and determine by actual experiment whether it was too saline for use on most crops. The machinery was accordingly ordered and has finally been installed after many vexatious delays due to floods and boggy roads. The pump is now set, the canals from it are constructed, and the plant is in good working order.

This is an exceptionally wet year. If next year is ordinarily dry it will be possible to show what can be done with irrigation, but with the perversity of inanimate things the natural forces all seem to combine against giving the pumping plant a satisfactory trial. There is no doubt that years of drought will come when irrigation will be badly needed, but at present the farmers are growing crops by dependence upon natural rainfall.

The engineers are continuing their investigations and will soon be able to make a full report upon the Red River project. They will also make investgations as to the quantity and quality of underground waters with reference to their use for irrigation. If these investigations prove satisfactory as to the water supply, another pumping plant will probably be installed for experiment with ground waters. The surveys and investigations in Oklahoma will not cease until a practicable project is found or it is demonstrated that the proper conditions do not exist for economical irrigation.

The Month in Government Forest Work

Testing Vehicle Woods

During the past few months the Forest Service has been conducting a series of tests on vehicle woods. These tests were made on three manufactured parts; buggy spokes, wagon poles, and axles. The material was furnished by wagon companies and wheel manufacturers, and the tests conducted at the timber testing station of the Forest Service at Purdue University, Lafayette, Ind. One series of these tests has been completed but all of the data is not yet ready for publication.

The material tested was of the grades in common use. Buggy spokes were of the grades A, B, C, D, E, and culls, for the sarven wheel. In this selection, the primary object was to determine whether the grading system was compatible with the strength and toughness of the spokes, and also to ascertain the relative strength and toughness of white and red hickory spokes. Five hundred spokes consti-

tuted the series. The poles were of two grades of oak and one grade of southern pine. Part of the common oak poles were trussed. Forty poles were tested. The axles were of hickory and maple of three designs, thimble, skein, thimble skein trussed, and long sleeve skein design, making forty-eight in all. The object in this series was to obtain the comparative strength of the two woods and of the different constructions.

The results from the spoke tests show more than 50 per cent error in the present grading system, which is largely due to the traditional prejudice and consequent discrimination against red hickory. No red spokes are now allowed in the A and B grades, yet these tests show that a large proportion of the red spokes now included in the lower grades should be, because of their strength and toughness, included in the highest grades. The resilience factor which is determined by maximum load and toughness, varies directly with the weight, showing that the best criterion for judging the utility of spokes is the weight. It is also shown by the tests that weight for weight, the red and mixed spokes are fully as strong as the white ones. Of defects serious enough to affect the strength those near the center of the spokes are considerably more damaging than the defects near the ends. A study of the tested spokes as they now appear at the Purdue University laboratory, would give much practical information to commercial graders. These tests will be supplemented by another series on spokes manufactured of sound dead hickory which occurs in considerable quantity in the South and is not now used for this purpose.

The tests on the wagon poles brought out several important points. The present manner of attaching poles could be much improved since the construction at the hounds is much weaker than the pole itself. The present style of trussing is of little value because the truss is applied along the neutral axis of the pole. The Southern pine pole will support a greater maximum load than the common oak pole, but is not as strong as the select oak pole. With reference to load at elastic limit, the Southern pine ranks first. The failure in the oak poles generally occurred near the hounds and were fibrous and localized. Fractures in the pine poles, on the other hand, extended over distances of five or six feet, long pieces often breaking off where a fracture occurred. These poles were not of the best grade of Southern pine, most of them having the appearance of shortleaf pine and being largely sapwood. The exact species will be determined later, yet, for commercial purposes this is comparatively unimportant because the Southern pines are largely sold under the name of "yellow pine" without distinction as to species.

Results from the axle tests have not been sufficiently correlated to warrant definite statements regarding them, but it can be said that there is considerable room for improvement in the present method of trussing.

Further testing work along this line will be carried on during the coming winter. A series of shaft tests on hickory and red oak will be made, a number on eucalyptus axles, and some on cultivator poles of red fir and longleaf pine.

New Forest Reserve

By Presidential proclamation, signed August 10, a new forest reserve has been created in south-central Montana, to be known as the Crazy Mountains Forest Reserve, taking its name from the mountain range which it covers. The mountains themselves are named from their rugged contours and peculiar profiles. They rise to a height of 11,178 feet above sea-level, and to 5,000 feet above the surrounding foothills. Their heavy snowfall is of the utmost importance to three river systems; the Yellowstone, the Musselshell, and the Missouri, through Sixteen Mile Creek. The new reserve lies about midway between the Little Belt Forest Reserve to the north and the Absaroga Division of the Yellowstone Forest Reserve to the south. The

Montana Railroad is about ten miles north and the Northern Pacific twenty-five miles south. Topographically, the Crazy Mountains may be divided into two sections, of which the southern is, without doubt, the roughest in the State. Here the streams, enclosed in deep canyons, take their rise in the melting snow of high peaks of slide rock. The northern part is less forbidding, the ridges being quite generally covered with grass. The mountains have a quite different climatic record from the surrounding lowlands. Fresh snow has been seen on the crests of the Crazy Mountains in August. From October to June there may be snow at any time. Snow drifts at the heads of some of the larger creeks, when seen in mid-July, show no signs of ever being completely melted. Rock Creek has even a small glacier at its head. Snow lies at a depth of from 3 to 6 feet in winter, and travel is then possible only on skees. In July and August there are frequent thunder showers in the peaks.

The forest is typical of the lodgepole pine forest of the Rockies, and that species grows in pure stand over three-tenths of the timbered area. Red fir covers two-tenths in pure stand, and the remaining five-tenths is a mixture of the two species, with the lodgepole pine predominating. In scattered growth there is some limber pine, balsam fir, juniper, Engelmann spruce, and the usual cottonwood and willow in the creek bottoms. Of the two main types, the lodgepole pine will average about 4,000 feet, board measure, to the acre, the red fir 6,000 feet. Lumbering operations on the reserve are not extensive, and the mills, six in number, not large. Since only the larger trees are taken, lumbering would be beneficial if forest fires did not almost invariably follow. There are no mines of importance, and the timber is used for ties, fuel, and ranch buildings. The greatest importance of the forest, then, is as a protective cover to conserve the heavy snow and rainfall, since the Crazy Mountains form a natural water-supply area for a growing and prosperous farming country in the foothill region around them.

Within the limits of the reserve sheep grazing is the most important industry, the sheepmen being permanently established on railroad lands which they have bought. Therefore the sheep-grazing problem is the largest one with which the administration of the new reserve will have to deal. Perhaps 100,000 sheep are ranged there, and some 1,200 goats. There are possibly 5,000 cattle and horses on the reserve. Through coöperation with the stock owners, there will be definitely established and thoroughly understood, regulations as to the duration of the grazing season, distribution of stock, and number grazed.

The sentiment of the region is generally in favor of the reserve because of two things: There will be Government control of the range, assuring both sheep and cattlemen in well-defined rights; and a prevention of fires. Yet, as a whole, the Crazy Mountains Forest Reserve will serve five principal uses: It will maintain a natural reservoir for the surrounding country, which belongs to the important type of "sub-irrigated land;" will preserve several excellent water-power sites; will prevent lumbering waste, and insure a permanency to the lumber supply; will equitably settle the grazing problem; will prevent fires.

The total area of the new reserve is 234,760 acres.

Timber Tests

A series of tests to determine the relative strength of green tamarack and green Norway pine timber has recently been made by the Forest Service at the timber testing laboratory at Purdue University, Lafayette, Ind. The material was furnished by the Kettle River Quarries Company of Minneapolis, and nearly all of it grew in St. Louis County, Minnesota. The strength values obtained apply only approximately to timber of the same species grown elsewhere.

Bending tests were made upon beams with a span of 13 feet 6 inches and ranging from 4 by 10 by 6 by 12 inches in cross-sections. From these tests, showing the strength and stiffness of sound green tamarack and Norway pine in structural sizes, the results were as follows:

Strength (Modulus of rupture—Tamarck, 4,600 pounds per square inch; Norway pine, 4,000 pounds per square inch.

Stiffness (Modulus of elasticity)—Tamarack, 1,240,000 pounds per square inch; Norway pine, 1,189,000 pounds per square inch.

Green tamarack thus appears to be uniformly stronger and stiffer than green Norway pine. When over-dry tamarack weighs twenty-nine pounds per cubic foot and Norway pine about twenty-four pounds per cubic foot.

Tamarack is usually of slower growth than the pine. Bending tests on small clear pieces indicate that strength decreases in tamarack when the rate of growth is faster than an inch in eight years, and in Norway pine when the growth is faster than an inch in ten years. Comparative tests on the seasoned timber of the two species will be made later.

Change of Boundaries

The boundaries of the Grand Canyon Forest Reserve, Arizona, have been changed by the exclusion from the reserve of a tract twelve miles long and six miles wide at the extreme northern limit of the reserve. Whereas the north boundary of the reserve formerly touched the Utah State line, it is now six miles south of it. At the same time a slight addition has been made to the reserve consisting of a narrow strip of land along the northern portion of the eastern boundary. This tract, twelve miles long and averaging little more than a mile in width, has been added to bring the reserve boundary out to the base of the mountains, where it can be readily located by the stockmen. The original boundary ran about two miles back from the base of the mountain, where it could not be seen except by the merest chance.

In the area recommended for exclusion there is no timber of value. The forest growth is of inferior pinon and mountain mahogany. The region is entirely without water, so that it is impossible to keep a patrol or to maintain range headquarters. Yet it contains the main highway to either side of the range. By its exclusion from the reserve, stock may be crossed at will, without any restrictions upon those who are compelled to use this highway, who would be under considerable inconvenience and difficulty in visiting forest officers for permits.

As the reserve now stands its area is 2,267,300 acres.

Holding Power of Railroad Spikes

The Forest Service has completed a series of tests to determine the holding power of different forms of railroad spikes. The tests were made on ordinary commercial ties of loblolly pine, oak, chestnut, and other woods. The spikes used were of four kinds—common driven spikes, a driven spike which has about the same form as the common spike with a lengthwise channel on the side away from the rail; screw spikes of the American type, and screw spikes similar to those in use on European railroads, and differing from the American spike mainly in the manner of finishing the thread under the head.

The common and the channeled spikes were driven into the ties in the usual manner to a depth of five inches. A hole of the same diameter as the spike at the base of the thread was bored for the screw spikes, which were then screwed down to the same depth as the driven spikes. The ties were then placed in the testing machine and the force required to pull each spike was recorded.

The average force required to pull common spikes varies from 7,000 pounds in white oak, to 3,600 pounds in loblolly pine, and 3,000 pounds in chestnut. The holding power of the channeled spike is somewhat greater.

For example, about 11 per cent more force, or 4,000 pounds is required to pull it from the loblolly pine tie. The two forms of screw spike have about the same holding power, ranging from 13,000 pounds in white oak to 9,400 pounds in chestnut, and 7,700 pounds in loblolly pine.

There is a marked difference between the behavior of driven and screwed spikes in knots and in clear wood. Knots are brittle and lack elasticity, so driven spikes do not hold as well in them as in clear wood. In the case of common spikes in loblolly pine the decrease of holding power is knots is as great as 25 per cent. On the other hand, screw spikes tend to pull out the whole knot which they penetrate. This increases the resistance so much that in loblolly pine the increase of holding power of screw spikes in knots is about 35 per cent over that for clear wood.

Adirondacks Improve

Woodsmen have favorable reports about districts in the Adirondacks which were sufferers in the destructive fires of four years ago. The immunity from these fires that has since prevailed, together with the great amount of rain that has fallen, has greatly helped the new growth that is now coming up, and nature is repairing the past ravages.

Cut His Own Trees

The Paper Mill tells the following regarding the cutting of planted trees: The Missisquoi Pulp Company had occasion to remove a number of spruce and balsam trees near one of its tenement houses, and to do this work put on hands employed in the wood preparing department. As it was noticed that the trees had grown quite rapidly, the company had the curiosity to have the yearly rings counted and it estimated the trees were about thirty years old. One of the men, who has resided in the vicinity all his life, was asked how old he thought the trees were. He replied: "I ought to know, for as a boy of seventeen or eighteen I helped to set them out, and it is thirty-eight or forty years since they were set out as very small trees."

It this boy had been told at that time that he would with his own hands cut down those trees and that they would be made into pulp and paper on this very property within less than a thousand feet from where the trees were set out, he would have said at least it was a fairy tale.

EUROPEAN LARCH (Larix Europaea)*

X.—Notes on Forest Trees Suitable for Planting in the United States

THE EUROPEAN LARCH is not indigenous to the United States, but has been generally introduced under cultivation. It is a native of northern and central Europe, where it is found on moist mountain sides. Small plantations for windbreaks and ornament have been made in various parts of this country from New England westward to South Dakota, and usually with fair success. Further experiments must be made, however, before definite limits of the range for economic planting can be determined. At present it seems evident that planting will be successful throughout the northeastern States, and westward through Indiana, Illinois, Michigan, and Minnesota, to eastern South Dakota, on soils that are somewhat moist and of moderate fertility.

Throughout northern Illinois the European Larch is used extensively as a street tree and occasionally in plant-

*Data furnished by the U. S. Forest Service.

tations, and seems admirably adapted to the soil and climate of that State. For prairie planting in this region it has given good satisfaction on moist soils in somewhat sheltered locations. It resists the cold very well, but is liable to injury from hot winds.

Unfortunately, in some parts of the West the Larch has fallen greatly into disfavor because of the practice of many nurserymen of substituting for it native Tamarack seedlings, dug or pulled in the swamps of Minnesota and Wisconsin. The Tamarack is a swamp tree, and though desirable in certain

Plantation of European Larch, Showing their Crowns and Slender Boles.

locations, is unfit for prairie and upland planting. Planters who desire European Larch should insist upon being supplied with nursery-grown trees and should see that they get what they order.

SOIL AND SITE.

In Europe the Larch is of largest size on loamy soil formed from the debris of granitic rocks, or in limy soil where the surface is kept cool by moisture. In northern Illinois, where some of the finest planted trees are found, the soil is a rich, black alluvial loam with a porous gravelly subsoil. The tree, however, is adaptable to varying conditions and will thrive on hillsides and uplands and on soils which are clayey with a nonporous subsoil. In general, soil of sedimentary nature seems best, although it need not be deep.

CHARACTERISTICS OF GROWTH.

The form of the European Larch is very similar to that of our native Tamarack. In a close stand it has a very straight, slender bole, which is valuable for poles, fence posts, joists, beams, ship masts, etc. The tree is light demanding, and when in a close pure stand or combined with slower-growing, more tolerant species, it cleans itself well of branches. The seedling up to an age of four and five years show a tendency to develop strong tap roots, but in later years an extensive lateral root system is developed.

On good soil and under favorable conditions the Larch is a rapid growing tree. Prof. S. B. Green states that "one tree grown at Owatonna, Minn., attained a height of about 50

feet and a diameter of 15 inches in thirty years, but so rapid a growth is uncommon here." Near New Haven, Conn., the best of the dominant trees of a small plantation have attained a height of 50 to 53 feet and a diameter of 9 to 12 inches in twenty-three years. The seedlings were imported from Europe and were about 2½ feet high and three to five years old when planted. In dense stands the diameter growth is often rather slow, in proportion to the rapid height growth.

THE WOOD; ITS ECONOMIC USES.

The wood of the Larch is heavy, hard, strong, flexible, and very durable in contact with the ground. When grown on good soil it is yellowish-white, but in cold, elevated situations it is reddish-brown and much harder. Because of its strength and durability, it is very valuable for cross-ties, poles, posts, etc., and is largely used in ship building.

PROPAGATION.

Reproduction is entirely by seeds. Propagation is best effected by transplanting nursery-grown seedlings or transplants to the plantation. The seeds are borne abundantly in small, upright cones, and are easily collected. In this country, however, because of the small number of trees which have reached fruiting age, it is necessary to use imported seeds, which may be obtained direct from foreign dealers or through the larger home seedsmen. Prices are as low as $1 per pound.

Although a deciduous tree, the Larch is a conifer and should be treated as such in all nursery and planting operations. Nursey culture is simple and should be conducted according to the general rules given in Bulletin No. 29 of this Bureau. Nursery seed beds should be prepared in moist loam, and the seeds sown in shallow drills 6 inches apart, and lightly covered with fine dirt. Partial protection from the sun and beating rain should be given the young seedlings for the first two years. The simplest screen for protective purposes is made of lath nailed to a light frame, the laths alternating with open spaces to their width, so as to give a half shade. These frames may be permanently fastened at a height of 5 or 6 feet above the beds so that a man can work under them, or may be temporarily supported on posts or poles 1½ to 2 feet from the ground. Seedlings may be transferred to the field when two years old, or at this age transplanted to nursery rows and not put in the field until a year later. In transplanting Larch it is absolutely essential that the work be done very early in the spring, as the buds start early and a disturbance of the plants after growth begins means death or serious injury to the young trees.

Plants in either a pure or mixed European Larch plantation should be set from 4 to 6 feet apart each way; the shorter distance is preferable in the West. In the West the ground must be broken and well subdued before the plants are set. Check rows may be made with a plow or cultivator and the plants set in by hand, or they may be set in holes dug with a spade. Corn may be raised between the rows for several years. Cultivation of the young plantation is essential in most cases. In the East the preliminary preparation of the land and the subsequent cultivation may be dispensed with.

Mixed plantations are in general most desirable. The Larch may be combined to advantage with the following species: White and Green Ash, White and Slippery Elm, Scotch Pine, Red Pine, White Pine, Norway Spruce, and Red Cedar. Often three or four of these species may be advantageously combined, as the European Larch, White Elm, White Ash, Red Cedar, or White Pine. In such mixtures considerable care and skill are required in the thinnings, which should be done when the trees begin crowding.

In many portions of the country others species are of greater value and better adapted for planting than the

European Larch. It is, however, a valuable tree for certain sections and for combining in many mixtures. In Europe it is not considered a lowland tree and the best specimens are produced on the uplands, but it readily adapts itself to wet, low ground, and should often be planted in moist situations where other trees would not thrive. As an ornamental tree it is of good form and in the spring is made beautiful by the delicate nature and verdant freshness of the newly expanded clusters of needle-like leaves.

ENEMIES.

The mature native Tamarack of the Northeast was almost entirely killed some eighteen years ago by the larvæ of a sawfly, and young trees are still seriously injured by insects. As yet no serious damage by this insect has been reported from plantations of the European species in the West, but the small plats which exist in New England have been badly injured and in some cases nearly destroyed by insect pests. In case of serious attack, specimens should be sent to the Division of Entomology for identification and suggestions as to control. On low ground a fungus known as *Trametes pini* often attacks the Larch and so destroys the substance of the wood that the tree breaks down in even a slight wind.

NOTABLE PLANTATIONS.

A grove of European Larch near Clear Lake, S. Dak., was planted on the high prairie about fifteen years ago (1886). The trees are now 3 to 5 inches in diameter at the base and 30 to 35 feet tall. The stand was originally very thick, the trees probably standing 3 feet by 4 feet. Most of the trees will each make a single post and there are many that would make stakes in addition, almost large enough for posts. The trees from which this plantation was started were shipped from England.

A plantation of one and one-half acres, now owned by Mr. Sulfin, is situated near Dundee, Ill. The trees were planted at a uniform distance of 4 by 4 feet and are now twenty-eight years old, tall and straight, with no side branches. On a half-acre plat that was measured, there were 400 trees with an average diameter at base of 6.4 inches, at 7 feet from the ground 5.1 inches, and an average height of 35 feet. Nineteen of the trees are now suitable for telephone poles, i. e., 9 or more inches in diameter and 30 feet high.

At Greenfield Hill, Conn., is a mixed plantation of European Larch and White Pine planted 5 by 5 feet each way in equal proportion. The site was rich cultivated land and the growth was correspondingly rapid. Measurements made on 7,509 trees when fifteen years old gave the following: Average height, 33.2 feet; diameter of average tree, 3.5 inches. Up to the summer of 1901 practically no injury had been done by the sawfly, but that summer the larvæ were present in large numbers and were rapidly defoliating the trees.

A variety of the common European Larch known as *Larix europoea siberica* is largely grown in central Russia. Prof. N. E. Hansen, of South Dakota, believes that it would be a very desirable tree for our prairie States, as it is much hardier than the common form and much superior to it in many ways. Our commercial growers should introduce this desirable variety.

The Land of To-morrow. By Major J. Orton Kerbey; 12mo.; 400 pp.; illustrated. W. F. Brainard, New York, 1906.

"The Land of To-morrow" is a descriptive narrative by a newspaper man and ex-consul, giving interesting experiences and observations during a journey to the headwaters of the Amazon and over the Andes through the unknown La Tierra de Manana, the California of South America. The book contains the history of a research for rubber, instituted while Col. Kerbey was consul to Para. Aside from its value as the only practical summary of the rubber industry, there is the added charm of adventure in a little known and practically undeveloped country, whose natural resources, in the lines of forests and mineral wealth, is vast. The many illustrations are excellent.

The Philippine Journal of Science. Published by the Bureau of Science of the Government of the Philippine Islands. Vol. I., Nos. 1 and 2, June and July, 1906. Manila, 1906.

The June and July numbers of the *Journal* contain a number of articles on various scientific subjects. Readers of FORESTRY AND IRRIGATION will ,however, be particularly interested in Mr. H. N. Whitford's contribution, on "The Vegetation of the Lamao Forest Reserve," appearing in both issues of the publication. The article contains some interesting tables of the various tree-species in sample plots, with both general and specific observations regarding tree growth and variety. Some interesting pictures of island forests are included.

Irrigation in Montana. Bulletin No. 72, Office of Experiment Stations, U. S. Department of Agriculture. By Samuel Forier, assisted by A. P. Stover and J. S. Baker. Washington, Government Printing Office, 1906.

In their study of conditions in Montana, Prof. Fortier and his assistants paid special attention to the means of bringing about the more economical use of the water supply—now abundant—in order to make possible the largest development of the State's agriculture, and correct present sources of waste. After discussion of the various phases of the situation, the bulletin makes certain recommendations which, it is hoped, will help the people of Montana in securing protective and corrective legislation. Prof. Fortier describes some improvements in ditch-construction, and in irrigation practice that should be valuable hints to the irrigator.

Forest Planting on Coal Lands in Western Pennsylvania. Circular No. 41, U. S. Forest Cervice. By S. N. Spring; 16 pp. Government Printing Office, Washington.

The occasion for forest planting in this locality—the most important bituminous coal region of the United States—rests primarily upon the growing need of pit props, and is intimately related to the whole industrial development of southwestern Pennsylvania. Intensive agriculture, forced by an increasing population has led, in many cases, to exhaustion of the soil, through poor methods and other causes, and when the coal mining industry shifts elsewhere, as it is certain to do in the future, the best crop such land can produce is timber. The present volume is rich in suggestions for planting in this locality, from the observations of the Forest Service in preparing a planting plan in this section for the H. C. Frick Coke Co.

Sugar Pine and Western Yellow Pine in California. Bulletin No. 69, U. S. Forest Service. 42 pp.; illustrated. Government Printing Office, 1906.

The object of the study here presented is to devise modifications in present lumbering methods which may lead to a more conservative treatment of the yellow and sugar pine forests of California. The latter has been one of the most valuable timber trees of the state, and, with yellow pine, with which it is intimately associated, both in the forest and the market, has been brought into greater prominence through the exhaustion of eastern pine forests. The bulletin makes it plain that conservative management is both necessary and practicable if the tree is destined to be extensively used.

DEPARTMENT OF THE INTERIOR, Washington. D. C., September 19, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Oregon, until 2 o'clock p. m., November 15, 1906, for the construction of a dam at the outlet of Bumping Lake, Washington, involving about 182,000 cubic yards excavation, about 960 cubic yards coucrete masonry, about 980 cubic yards riprap and rockfill, and about 72 M. feet B. M. hewn timber. Particulars may be obtained at the offices of the United States Reclamation Service, Washington, D. C., Portland, Oregon, and at North Yakima, Washington. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., September 19, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Oregon, until 2 o'clock, p. m., November 15, 1906, for the construction of about 12 miles of main canal in the Tieton Canyon, near North Yakima, Washington, with diverting dam, headworks, tunnels and other appurtenant structures, involving about 13,000 linear feet of tunnel, 44,000 linear feet of concrete lined canal, 4,000 linear feet of unlined earth canal and 1,000 linear feet of concrete flumes. Particulars may be obtained at the office of the United States Reclamation Service, at Washington, D. C., Portland. Oregon, or North Yakima, Washington. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington. D. C., July 24, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Oregon, until 3 o'clock p. m., September 17, 1906, for building the Cold Springs Dam, near Hermiston, Oregon, including about 694,000 cubic yards of earth and gravel excavation, about 3,100 cubic yards of rock excavation, about 3,110 cubic yards of concrete, and about 35,000 cubic yards of riprap and rock-fill. Particulars may be obtained at the offices of the U. S. Reclamation Service at Washington, D. C., Portland, Oregon, and Hermiston, Oregon. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., August 3, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Oregon, until 3 o'clock p. m., October 1, 1906, for building the main and lateral ditches of the distributing system, Umatilla Project, Oregon. The work is divided into two nearly equal schedules and includes about 315,000 cubic yards of earth and rock excavation. Particulars may be obained at the office of the United States Reclamation Service at Washington, D. C., Portland, Oregon, and Hermiston, Oregon. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., July 27, 1906. Sealed proposals will be received at the office of the Reclamation Service, Garden City, Kansas, until 2 o'clock p. m., September 28, 1906, for the construction of deep and shallow wells, suction pipes, pumping stations, siphons, concrete lined conduits, and fencing. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, Washington, D. C., or to the Engineer, Garden City, Kansas. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D C., August 7, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Garden City, Kansas, until 10 o'clock a. m., September 28, 1906, for furnishing 5,000 barrels of Portland cement f. o. b. cars at bidder's mill. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, Washington, D. C., and the Engineer, Garden City, Kansas. THOS. RYAN, Acting Secretary.

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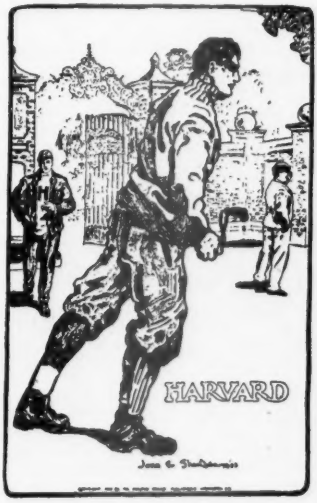

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2. The preservation and development of our national resources by the construction of storage reservoirs by the Federal Government for flood protection, and to save for use in aid of navigation and irrigation the flood waters which now run to waste and cause overflow and destruction.

3. The construction by the Federal Government of storage reservoirs and irrigation works wherever necessary to furnish water for the reclamation and settlement of the arid public lands.

4. The preservation of the forests and reforestation of denuded forest areas as sources of water supply, the conservation of existing supplies by approved methods of irrigation and distribution, and the increase of the water resources of the arid region by the investigation and development of underground supplies.

5. The adoption of a harmonious system of irrigation laws in all the arid and semi-arid states and territories under which the right to the use of water for irrigation shall vest in the user and become appurtenant to the land irrigated, and beneficial use be the basis and the measure and limit of the right.

6. The holding of an annual Irrigation Convention, and the dissemination by public meetings and through the press of information regarding irrigation, and the reclamation and settlement of the arid public domain, and the possibilities of better agriculture through irrigation and intensive farming, and the need for agricultural education and training, and the creation of rural homes as national safeguards, and the encouragement of rural settlement as a remedy for the social and political evils threatened by the congestion of population in large cities.

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